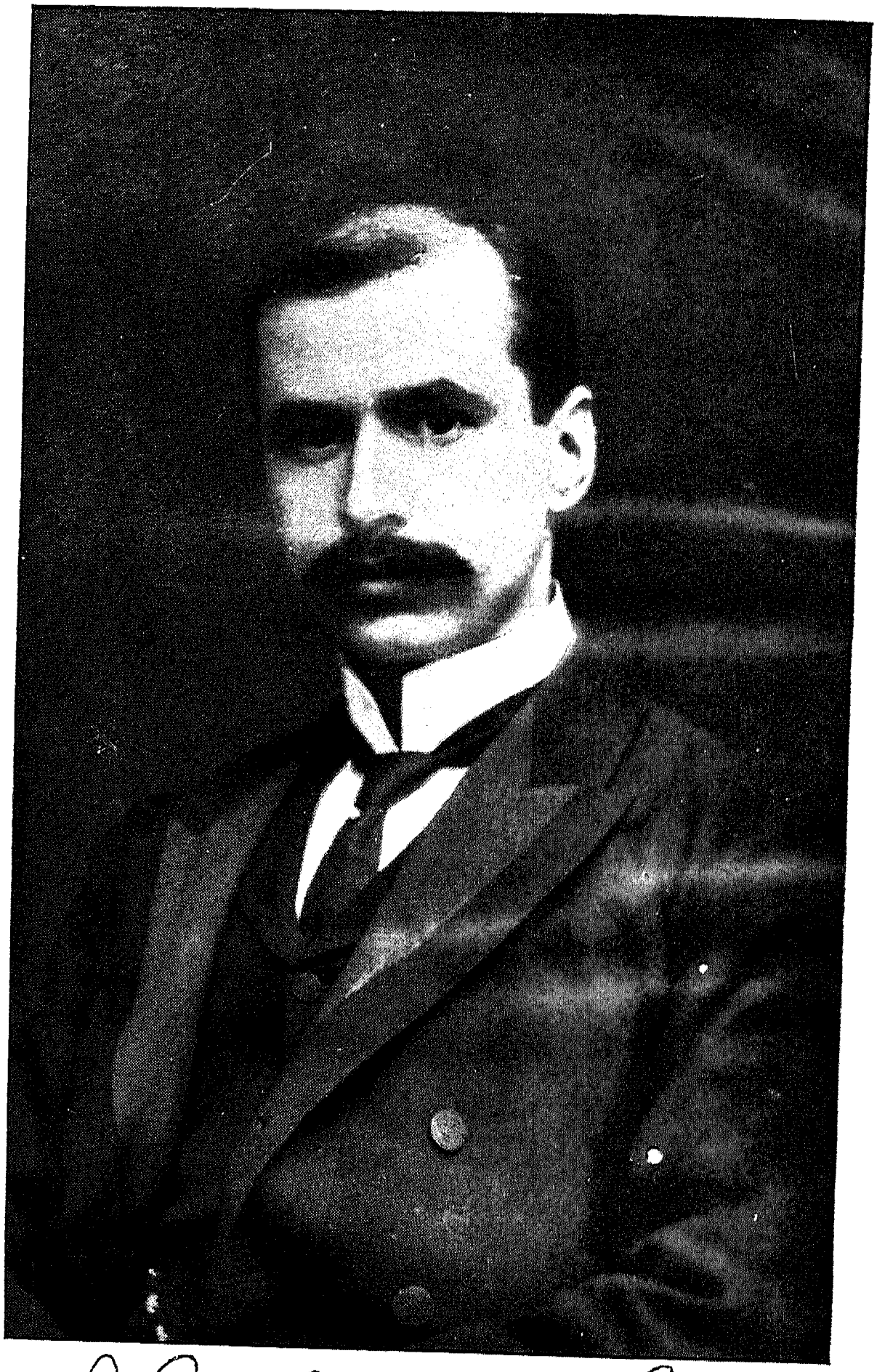
THE NATION'S WEALTH

WILL IT ENDURE?

L. G. CHIOZZA MONEY

POONA UNIVERSITY LIBRARY

COLLINS' CLEAR-TYPE PRESS
LONDON & GLASGOW



L. G. Chiozza Money

PREFACE

THIS work attempts to sketch in broad outlines the origin, character, and extent of British wealth. It is a subject which gains by breadth of treatment, for the nature of the British economy is obscured for many by the bewildering complexities of modern civilisation. The author has endeavoured to preserve a due perspective, and to convey a proper sense of proportion in a matter in connection with which it is only too easy to give undue weight to minor factors.

A great difficulty in writing such a work as this is to use justly terms relating to magnitude. It is necessary to bear in mind that the smallest affairs of a nation of forty-six millions of people, if stated in the aggregate, appear to have considerable bulk, and to exhibit a condition to which such terms as 'large,' 'great,' or 'wealthy' may be properly applied. Thus, if forty-six millions of

people have each a small income, the figure expressing the aggregate of forty-six million small incomes appears gigantic, and it is easily forgotten that wealth which in mass calls for expression in nine or ten figures appears as a thing of modest dimensions when it is divided by the number of people whom it sustains. Thus also it is with trade and with production. I have therefore endeavoured to make it clear, in dealing with aggregate figures, what national aggregates amount to when they are properly related to the great mass of people of whose activities they are expressions.

That the conditions of British wealth are static is a common and dangerous assumption. That assumption is challenged in this volume. The British national economy is revealed as a thing of uncertain equilibrium, the future of which it may be beyond the power of the British people to determine. From a careful examination of the facts of the case, the conclusion emerges that as modern British wealth depends upon a peculiarly good supply of coal, and as the duration of the Coal Age is uncertain, it is the supreme national duty

to regard the present as a period of preparation, during which it is necessary so to train our people, and so to mould our social and industrial institutions, that the nation may be fortified for that scientific future as to which, while there are many uncertainties, there is one absolute certainty—that Coal will pass.

Every care has been taken in preparing the many statements of fact that are made in this volume, but I should be obliged to any reader who would advise me of any inaccuracy that may have unwittingly crept into its pages.

L. G. CHIOZZA MONEY.

March 21, 1914.

CONTENTS

CHAPTER I

THE FOUNDATIONS OF BRITISH WEALTH

	PAGE
BRITAIN'S RECENT POVERTY	17
POVERTY OF OLD AGRICULTURAL STATES	18
GROWTH OF POPULATION SINCE 1750	19
POPULATION IN THE EIGHTEENTH CENTURY	23
COAL THE SOURCE OF BRITISH WEALTH	26
THE TURNING-POINT IN BRITISH ECONOMIC HISTORY	26
IRON FIRST SMELTED WITH COAL IN 1750	28
BRITISH ENGINEERING IN THE EIGHTEENTH CENTURY	29
COAL AND BRITISH INVENTION	30

CHAPTER II

THE RAPID RISE TO WEALTH

THE INDUSTRIAL REVOLUTION AS A SAVER OF LIFE	37
INDUSTRY AND THE GROWTH OF POPULATION	38
PROGRESS OF BRITISH IRON PRODUCTION	41
THE WORLD'S IRON PRODUCTION	42
RISE OF THE COTTON INDUSTRY	44
GROWTH OF THE WOOLLEN TRADE	45
CONSUMPTION OF TIMBER	47
BRITISH EXTERNAL TRADE IN THE EIGHTEENTH AND NINETEENTH CENTURIES	49
UNITED KINGDOM COMMERCE 1805–1913	53

CHAPTER III

THE NATIONAL ECONOMY

	PAGE
BRITAIN NATURALLY POOR SAVE AS TO COAL	57
A SKETCH OF BRITISH NATURAL RESOURCES	57
WE RAISE ONE-HALF OF THE FOOD WE EAT	58
OUR NEGLECT OF AFFORESTATION	58
THE SMALL PRODUCTION FROM BRITISH ORES	60
OUR DEPENDENCE UPON IMPORTED MATERIALS	60
WHY COAL IS A MAGNET FOR RAW MATERIALS	64
WHY IRELAND AND WILTSHIRE ARE POOR	65
COAL EXPORTS AND BRITISH SHIPPING	66
PRACTICAL WORKING OF THE BRITISH NATIONAL ECONOMY	69
ANALYSIS OF BRITISH COMMERCE IN 1913	70

CHAPTER IV

THE BRITISH PRODUCTION OF MATERIAL WEALTH

PERMANENT WEALTH CANNOT BE BASED UPON TRAFFIC	74
THE CENSUS OF PRODUCTION ACT	75
THE BRITISH INDUSTRIAL OUTPUT IN 1907	77
THE BRITISH AGRICULTURAL OUTPUT IN 1908	84
THE BRITISH PRODUCTION OF MATERIAL WEALTH	85
THE BRITISH INCREMENT OF MATERIAL WEALTH THROUGH PRODUCTION AND TRADE	86
A NATION CHIEFLY CONSISTING OF POOR CUSTOMERS	89
A SUGGESTED POVERTY LINE IN 1914	90

CHAPTER V

SOME STUDIES IN UNDER-CONSUMPTION

PAGE

THE SMALL OUTPUT OF DWELLING-HOUSES . . 94
THE POOR PRODUCTION OF FURNITURE . . 97
OUR CONSUMPTION OF COTTON GOODS . . . 99
OUR CONSUMPTION OF WOOLLEN GOODS . . 101
THE INADEQUATE PRODUCTION OF THE GLASS TRADE 102
BRITISH WEALTH A VENEER 104

CHAPTER VI

THE NATIONAL DIVIDEND

DEFINITION OF THE NATIONAL DIVIDEND . . 105
THE NATIONAL INCOME CONSISTS OF BOTH GOODS AND SERVICES 109
ESTIMATE OF THE NATIONAL DIVIDEND . . 109
BROAD OUTLINES OF THE DISTRIBUTION OF INCOME 110
THE NATIONAL INCOME NOT LARGE ENOUGH TO CONFER GENERAL COMFORT 111
THE EFFECT OF ILL-DISTRIBUTION UPON PRODUCTION 111
THE EFFECT OF BETTER DISTRIBUTION ILLUSTRATED 112

CHAPTER VII

THE NATIONAL CAPITAL

MAN, NATURE, AND POVERTY 121
THE CONQUEST OF POVERTY MEANS THE CONQUEST OF NATURE 123
ESTIMATE OF BRITISH CAPITAL IN 1914 . . 124
BRITISH AND PRUSSIAN RAILWAY CAPITALS COMPARED 126

PAGE
COMMERCIAL CAPITAL OFTEN NOT MATERIAL WEALTH 128
BRITISH OVERSEA INVESTMENTS 129
WHERE BRITISH CAPITAL IS INVESTED . . . 131
HOW TRIBUTE IS RECEIVED FROM ABROAD . . 132
OVERSEA INVESTMENTS DISCUSSED . . . 134
MR BALFOUR ON THE NON-NATIONAL CAPITALIST . 135
THE PANAMA CANAL AS AN EXAMPLE OF NATIONAL INVESTMENT 137
NEED FOR NATIONAL DIRECTION OF INVESTMENT . 138

CHAPTER VIII

THE FRUSTRATION OF CAPITAL SAVING

THE INADEQUACY OF PRESENT CAPITAL SAVING . 140
THE REVELATIONS OF THE JOINT STOCK COMPANY RECORDS 141
THE FRUSTRATION OF ATTEMPTS TO SAVE . . 143
HOW SAVINGS ARE WASTED 144
THE CAPITALISATION OF USURY 145
THE NEED TO USE MORE CAPITAL IN EXPERIMENTS 148

CHAPTER IX

THE FRUSTRATION OF WEALTH PRODUCTION

NO PROPERTY IN IDEAS 151
HOW INVENTIONS COME TO BE MONOPOLISED . 153
IDEAS, AND NOT CAPITAL, REPRODUCTIVE . . 154
THE NEGLECT OF INVENTIONS 157
THE LACK OF ORGANISATION OF WORK . . . 160
BRITISH WEALTH CONDITIONS NOT STATIC . . 162

CHAPTER X

WILL BRITISH WEALTH ENDURE?

PAGE

THE BRITISH PECULIAR BUT TRANSITORY ADVANTAGE 164
THE RISE OF GERMANY AND AMERICA . . 165
THE WORLD'S COAL OUTPUT AND THE WORLD'S WEALTH 166
JEVONS AND THE COAL COMMISSION OF 1866 . 172
THE COAL COMMISSION OF 1901 173
THE QUESTION OF COAL EXHAUSTION . . . 173
BRITISH COAL RESOURCES 177
THE BRITISH COAL DILEMMA 180
JEVONS ON THE TURNING POINT IN BRITISH INDUSTRY 181
THE COAL RESOURCES OF THE WORLD . . . 183
COMPARATIVE COAL RESOURCES OF BRITAIN, GERMANY, AND AMERICA 187
COMPARATIVE COST OF GETTING COAL . . . 190
THE PROGRESS OF THE UNITED STATES . . 191
THE PANAMA CANAL AND BRITISH SHIPPING . . 195

CHAPTER XI

THE FUTURE OF POWER

COAL AND ALTERNATIVE SOURCES OF POWER . 206
BRITAIN ONE OF THREE COUNTRIES POSSESSING A PECULIAR ADVANTAGE 206
OUR RELATION TO NEW SOURCES OF POWER . 209
THE WORLD'S MINERAL OIL 210
HOW OIL FUEL AFFECTS OUR SHIPPING . . 213
THE DEVELOPMENT OF WATER POWER . . 215
THE GREAT QUESTION OF ATOMIC ENERGY . . 217
THE PROSPECT OF UNIVERSAL AND UNLIMITED POWER 222

CHAPTER XII

THE NATION'S DUTY

	PAGE
THE COAL AGE MUST PASS	224
THE NEW SOURCE OF POWER WILL PROBABLY BE EXERCISABLE IN MANY PLACES	225
CERTAIN EFFACEMENT OF OUR EXISTING PECULIAR ADVANTAGE	226
THE QUESTION OF COAL CONSERVATION	227
BRITISH COAL AND BRITISH LAW	227
A PERMANENT NATIONAL POWER COMMISSION SUGGESTED	229
THE AMERICAN NATIONAL CONSERVATION COMMISSION	229
COMPARATIVE NATURAL RESOURCES OF BRITAIN AND AMERICA	230
THE EXPLOITATION OF AMERICAN RESOURCES	232
THE WASTE OF AMERICAN COAL	233
THE WASTE OF BRITISH COAL	235
COAL-GETTING BY MACHINERY	236
CENTRAL ELECTRICAL POWER STATIONS	237
THE SCHEME OF MR S. Z. DE FERRANTI	238
OUR DUTY TO POSTERITY	245
THE REMAINDER OF THE COAL AGE A PERIOD OF PREPARATION	246
THE TRAINING AND PREPARATION OF THE BRITISH PEOPLE	247
EDUCATION AS IT IS	248
A COMPARISON OF BRITISH AND GERMAN BRASS-WORKERS	250
NATIONAL ORGANISATION THE SUPREME DUTY	252

The Nation's Wealth

Will It Endure?

CHAPTER I

THE FOUNDATION OF BRITISH WEALTH

THE wealth of the United Kingdom is a matter of recent growth. The greater number of the well-to-do families of the United Kingdom are newly rich. We have to go back in British economic history no further than one hundred and fifty years, or about five generations, to find Britain a poor agricultural State, with another small and poor agricultural community, Ireland, by its side. To-day, Great Britain is, in the ordinary acceptance of the term, wealthy—we shall see presently with how much or how little reason the term may be used—but she has still by her side, as though to remind her of her recent condition, a poor Ireland.

The wealth of great modern States is the result of freeing labour from work upon the land. We have to differentiate here between

'old' nations and small Colonial communities nation-making in enormous 'new' territories in the course of primal development. In 1914, Canada has 7,500,000 persons—a population not much greater than that of Greater London—working upon the natural resources of a territory of over 3,700,000 square miles, while Argentina has some 7,000,000 persons developing the virgin fertility of 1,117,000 square miles. In such circumstances it is possible in our time for a community, although mainly devoted to agricultural pursuits, to be wealthy, although it is wise, in such cases, to seek to create a better balanced economy, and a greater diversity of employments, by developing manufacturing industry as soon as may be.

It is not to such communities that I refer when I define the conditions of wealth production in a great modern State. The United Kingdom is an old civilisation, and it is true of every old civilisation that if it remains an agricultural community it remains in a condition of natural poverty. If we survey the populous countries of the world, we find it universally true that those which have remained chiefly agricultural have remained

poor, while those which have become mainly industrial have become comparatively rich.

A century and a half ago, Britain was a poor and backward agricultural country, with a small population and no prospects. England and Wales together had then a population of rather more than 6,000,000 people, which may be usefully compared with the fact that the Administrative County of London now contains over 4,500,000 persons. Ireland had then a population of about 3,000,000, and Scotland perhaps 1,250,000 more, making a total population for what is now the United Kingdom of between 10,000,000 and 11,000,000 people. The following statement shows how population has progressed since 1750 :—

GROWTH OF POPULATION, 1750–1911

	1750	1801	1901	1911
England and Wales	6,300,000	8,900,000	32,500,000	36,100,000
Scotland	1,200,000	1,600,000	4,500,000	4,800,000
Ireland	3,000,000	5,000,000	4,500,000	4,300,000
U. Kingdom	10,500,000	15,500,000	41,500,000	45,200,000

The figures for 1750 are estimated. All the other figures, save that relating to the Irish population in 1801, which is also estimated, are from the Census reports.

The population of England, Wales, and Scotland grew enormously in a hundred and sixty years, while the population of Ireland, after rising in 1841 to a maximum of a little over 8,000,000, fell by 1911 to 4,300,000, a figure much smaller than the number of people she contributed to the United Kingdom when the Act of Union was passed into law. Great Britain, the land of industry, grew rapidly, while Ireland, lacking the necessary natural resources to sustain machine industry, and necessarily compelled to devote herself largely to agriculture, saw her population depart in millions to new lands whose rich fertility and magnificent resources offered a greater return to labour. Chiefly the Irish emigrant found a home, and very wisely, in the naturally richest land in the world, the United States, but the not inconsiderable proportion of Irish names in many English towns shows that not a few emigrated within the United Kingdom, in spite of the old antipathy which so often caused 'No Irish need apply'

to appear in English advertisements for domestic servants.

It is a pregnant consideration that a wealthy Great Britain should exist side by side in the North Sea with a poor and thinly-populated Ireland. That fate should have been so kind to the one island and so unkind to its neighbour is a fact that arrests attention, and it is full of meaning for the student of the nation's wealth.

So little were the facts of the case appreciated by the powers of government, however, that when estimates were got out of the cost of paying Old Age Pensions to poor persons in the United Kingdom aged seventy years and upwards, the number of such persons in Ireland was greatly underestimated. A great and notable thing was forgotten, so easy is it for a nation to misunderstand its own development. We forgot that Ireland, after rising in population to over 8,000,000 in 1841, had subsequently lost nearly one-half of its people, and that it was the young and the vigorous who had chiefly emigrated, and that, therefore, Ireland contained an undue proportion of aged persons. So it came about that when the Old Age Pensions Act was passed, and

Ireland presented her bill, we rubbed our eyes in astonishment that she had so many old people.

Nor is this the only illustration that could be adduced to show how the leaders of a nation may misunderstand, or even entirely overlook, the economic factors of its development. We are not concerned here with the merits of the great fiscal controversy which opened in 1903, but it furnishes a most remarkable illustration of lack of sense of economic proportion. As the enormous output of speeches, articles, books, pamphlets, and leaflets in connection with the controversy shows, the debate was almost invariably conducted as though the wealth of the United Kingdom depended mainly upon whether or not it levied protective import duties, and the basic cause of the modern prosperity of Great Britain was completely, or almost completely, ignored. Free Trade has been an exceedingly great advantage to the United Kingdom as a whole, but Free Trade has not created a prosperous Ireland.

To begin intelligently the study of the nation's wealth it is necessary to understand the causes of that wealth. The facts to which,

we have referred show clearly that a cause worked in Great Britain which did not work in Ireland. The size of the British populations in 1750, and the stagnant condition of the country at that date, shows that the cause of British prosperity had not begun as yet to operate. The most careful examination made by Professor E. C. K. Gonner of the population of England in the eighteenth century, given in a paper read to the Royal Statistical Society, affords us the following statement :—

GROWTH OF THE
POPULATION OF ENGLAND AND WALES
IN THE EIGHTEENTH CENTURY

1700	5,800,000	(5,550,000 to 6,000,000)
1750	6,300,000	(6,300,000 to 6,500,000)
1801	8,900,000	

We see that in the first half of the eighteenth century the population made little or no progress, the probable increase being no more than about 500,000. Indeed, it is probable that between 1650 and 1750 the population of England and Wales grew by as little as 750,000 to 1,000,000. But observe the striking change which occurred in the second half of the eighteenth century. The 6,300,000 or

thereabouts of 1750 grew to 8,900,000 in 1800, the latter being a Census figure exclusive of 300,000 men serving abroad in the Army, Navy, etc. After fifty years, nay, after a century, of something approaching stagnation, the English and Welsh population increased in fifty years by nearly 3,000,000, or by roundly 50 per cent.

I have said that the England of 1750 was a poor agricultural State, but that is to give an inadequate idea of its poverty. For the husbandry of that time was still very largely the open-field system of ancient days, the origin of which historical inquiry has failed entirely to elucidate. We have to picture the people of the village, under the lord of the manor, cultivating the land still parcelled out in the acre strips, a furlong in length and four rods (roods) wide, in which they were anciently cultivated while yet the land was held in common by village communities, and when each contributor of the services of an ox or plough to a day's ploughing was allotted the produce of an acre strip, or of several such strips, according to his contribution to the common stock.

In 1750 the land of many manors was still

thus parcelled up, so that the cultivated land of the manor was like in appearance, as Mr Seebohm puts it in his *English Village Community*, to a spider's web, the lines of the web being represented by the green 'balks' of turf which separated each man's strip from that of his neighbour. Imagine such acre strips divided amongst the freeholders and copyholders in such fashion that one man might own five, ten, or twenty separate acres, far removed from each other, and we get a picture of a kind of husbandry which gave poor results for much labour, and the origin of which was unknown to those who practised it by custom.

It was against this organised waste that the Inclosure Acts were directed. Between 1709 and 1845 some 4000 Acts of Parliament were passed, which swept away the open fields, re-allotted the lands concerned between the various parties interested in them, obliterated the ancient immemorial acre strips, robbed the landless labourers of their commons, and gave us the hedged farms, large and small, as we see them to-day. It was a form of legislation which saw successive Parliaments of landlords doing that which it pleased them

to do, and erecting their own desires as law.

It is not our province here to discuss these things at length. Suffice it to say that on the economic side the Inclosure Acts were good, in so far as they increased the productivity of the soil by destroying the open-field system, but that this good was purchased at the price of placing the countryside in the grip of the landlord, of reducing great areas of hitherto unalienated land to private ownership, and of filching the commons from the poor.

We have said that the Inclosure Acts began early in the eighteenth century, but there had been continuous enclosure during the previous 200 years. The effect was undoubtedly by enlargement of agricultural output to make it possible to support a larger population, but we have to look further for the chief cause which made the middle of the eighteenth century a turning-point in British economic history. *It is to be found in the fact that it was in the second half of the eighteenth century that Britain began to make serious economic use of her coal.*

In his great work, *The Coal Question,*

published in 1865, the late Professor Stanley Jevons summed up the influence of coal upon British economy as follows :—

'The history of British industry and trade may be divided into two periods, the first reaching backward from about the middle of the eighteenth century to the earliest times, and the latter reaching forward to the present and the future. These two periods are contrary in character. In the earlier period, Britain was a rude, half-cultivated country, abounding in corn, and wool, and meat, and timber, and exporting the rough but valuable materials of manufacture. Our people, though with no small share of poetic and philosophic genius, were unskilful and unhandy, better in the arts of war than those of peace; on the whole, learners rather than teachers.

'But, as the second period grew upon us, many things changed. Instead of learners, we became teachers; instead of exporters of raw materials, we became importers; instead of importers of manufactured articles, we became exporters. What we had exported we began by degrees to import; and what we had imported we began to export.'

The more closely this broad generalisation is subjected to analysis, the more clearly we realise how true it is that coal has made modern Britain, and it is the fact that England, Wales, and Scotland each possess considerable stores of coal, while Ireland has none, which is the explanation of the existence side by side at the gate of Europe of two islands, the one 'rich' and the other 'poor.'

The year 1750 marks the first successful smelting of iron with coal by Abraham Darby the younger. In his works at Coalbrookdale, in Shropshire, he succeeded by 1756 in producing twenty tons of coke-smelted iron per week at a profit. From that time forward the new method of iron manufacture carried all before it. By 1788 we were producing 68,000 tons of iron. Yet, as recently as 1740, England was producing only about 17,000 tons of iron out of 100,000 tons made in Europe. In the years 1729 to 1735, according to Scrivener's *History of the Iron Trade*, we imported about 25,000 tons of iron on the average per annum, whereas we exported only about 5000 tons. Prior to 1750 the Continent of Europe had not only greater natural advantages in the iron trade

than we had, but it produced better metallurgists. The middle of the eighteenth century, indeed, found Britain with an iron trade which was declining. We had not wood enough to supply the necessary charcoal, and fuel was everything in the matter. The forests of the South of England had been despoiled to sustain the trade, and, as showing what the command of fuel meant, it is on record that the iron trade in part migrated to Ireland because she had timber. It is a curious thought that if Ireland had possessed coal and Great Britain had had none, the work of Abraham Darby would have made Ireland a rich country—a country which doubtless would have felt that mingling of pity and contempt for the backward English across St George's Channel which some English people now feel for Ireland.

Jevons drew from Smiles's *Lives of the Engineers* some striking illustrations of the backwardness of British industry and invention before 1750. As late as 1748 the building of Westminster Bridge was entrusted to the Swiss architect, Labelye. When it was required to pump Thames water for the supply of London, Peter Morice, a Dutchman,

was employed to erect a tidal engine. When in 1708 windmills were wanted to drain Scotch coal-mines the only available millwright was found to be John Young of Montrose, who had been sent at the expense of that town to Holland to inspect Dutch machinery.

The anecdote of the Montrose millwright brings us to the great inventions which transformed the conditions of coal-mining, which made it possible to employ British coal as it had never been used before, and which, as it were, liberated the inventive genius of the British people and stimulated a lethargic country into varied and far-reaching activities.

In 1705 Newcomen patented his 'fire' or 'atmospheric' engine, which employed a jet of water in a cylinder to condense steam under a piston, and so brought atmospheric pressure to bear to depress the piston, to bring down a beam, and so to raise a pump rod attached to the other end of the beam. Newcomen's engine, like that of Savery, his predecessor and co-worker, was a pumping engine, invented for the specific purpose of *pumping water out of coal-mines.* It was the

necessity to get water out of the coal-workings that was the mother of the steam-engine.

The new method got to work slowly, as may be imagined, and it was not until the eighteenth century was well advanced that coal development got well under way. The smelting of iron with coke gave a great impetus to it, and the great work of James Watt in improving the steam engine marks another milestone with the date 1769. It was in 1750 that James Watt first saw a model of Newcomen's atmospheric engine.

The railway, like the steam-engine, sprang from the needs of coal-getting. The first railway was a simple track made of hard, wooden rails, and their use is recorded at Whitehaven in 1738. Next, iron slips were fixed to the wooden rails to make them last longer, and by-and-by the Coalbrookdale Works turned out iron rails when the problem of smelting iron with coke had been surmounted. Then came the great achievement of applying steam power to locomotion upon rails. Again the necessities of the coal-mines provided the spur.

Richard Trevithick (1771-1833), who was the inventor of the locomotive, was a Cornish

mining engineer, and George Stephenson (1781-1848), who completed the work and left it in essentials the steam locomotive of to-day, was an engine-wright at Killingworth Colliery. It was to improve coal transportation that Trevithick and Stephenson worked. George Stephenson knew well how much coal meant to the nation. Smiles quotes him as saying: 'The strength of Britain lies in her iron and coal beds; and the locomotive is destined, above all other agencies, to bring it forth. The Lord Chancellor now sits upon a bag of wool, but wool has long ceased to be emblematical of the staple commodity of England. He ought to sit upon a bag of coals.'

The secret of coal power discovered, a thousand inventions followed. Men's minds were exercised upon the use of power, and machines multiplied, at first slowly and in the face of the not unnatural hostility of craftsmen, and then rapidly and ever again more rapidly. The Industrial Revolution was accomplished, and population grew swiftly as the means of subsistence multiplied. By 1801, as we have seen, there were 9,000,000 people in England and Wales, and the lapse

of another fifty years doubled that number. Whereas in the first half of the eighteenth century the growth was about 500,000, in the second half it was about 3,000,000, and in the first half of the nineteenth century it was 9,000,000. The machines, regarded in their early days as the enemies of life, were making it possible for the children who were born to live.

Britain's magnificent store of coal, then, is the secret of her rise to wealth. For long it gave her a commanding position of advantage. Of the lands inhabited by white races, three, and three only, stand out as pre-eminently gifted with coal power. They are Britain, the United States, and Germany. When the early British inventors unlocked coal, they worked for every nation which possessed coal, but at that time, of the three great coal countries, Britain alone was in a position to make good use of the wonderful discoveries.

America, then as now the greatest coal and iron country in the world, as yet lacked population, and her natural wealth had, perforce, to lie dormant. Germany, the second coal country of the world—for there

is little doubt that her coal is superior to ours—was as yet a geographical expression, a cockpit of war, torn by internal dissensions, and destined for long to suffer from the conflicts which had begun with the Thirty Years' War. Germany, in spite of her ancient skill in industry and trade, was not seriously to enter the commercial lists until the unity won in 1870 secured her internal peace.

It was not until a generation ago that America and Germany were enabled to get into the running with ourselves. When they did, their resources told just as those of Britain had told long before. In 1914, Britain is third in rank as iron producer; yet, as recently as 1885, she produced as much pig-iron as America and Germany put together. That change is no more wonderful than the rise of Britain in the days when she was the most important workshop of the world.

The considerations which have been advanced are easily the most important which can engage the attention of the student of British wealth or of those responsible for the governance of the United Kingdom. Jevons, fifty years ago, foresaw, because he so clearly grasped the importance of the coal question,

and because he knew that the United States was a country greatly superior to Britain in coal resources, that America was destined to lead us in point of wealth, and it was only because the extent of German coal resources were not known to him that he failed to prophesy a brilliant future for Germany.

To-day, half a century after the work of Jevons, that which made Britain wealthy has magnified America and Germany even more than Britain, and in a minor degree has profited the smaller coal countries. In some respects it appears that the stimulus of the early days of large scale coal-getting, which promoted British discovery and invention, has passed, and that the Continent of Europe has again become, as in the old days of British poverty, the chief seat of scientific inquiry and achievement. The new industries which appear, as witness the motor car trade, the ferro-concrete construction trade, the flying-machine industry, the kinematograph industry, are mainly of foreign origin. Whereas a generation ago the student of engineering came here to learn his trade, it is not in the Britain of to-day that the chief exponents of the new engineering are to be found.

It is for those charged with the conduct of the nation to question themselves as to whether there are not many signs that we are beginning to pay dearly for the neglect of science by our schools and universities. We do not know how long coal is destined to remain the arbiter of the wealth of nations, but at least we may be assured that if we cannot afford to neglect science now, while the possession of coal helps us, still less shall we be able to dispense with it in that certain day when coal will be dethroned. To these vitally important considerations we shall return in these pages.

CHAPTER II

THE RAPID RISE TO WEALTH

We have seen the swift progress of Britain through the unlocking of her coal-seams illustrated by the increase in population. There are those to-day who, seeing nothing but the evils and the shortcomings of machine industry, imagine that the Industrial Revolution brought death with it. The truth is the very reverse. The growth of industry based on power was a giver of life.

Let these words not be misunderstood. I am not neglectful of the awful conditions in which the great manufacturing towns grew apace. I am well aware that if in these early days men had not been misled by the worship of unrestricted competition, towns like Manchester and Birmingham might have grown to a health and beauty which they now sorely lack. But it is important to bear in mind that, with all the social evils which the blindness of our rulers permitted to grow unchecked,

power industry preserved lives which, before the advent of power industry, were sacrificed for lack of the means of subsistence.

If we consider again the figures which were given in the last chapter relating to the stationary character of the population in the early part of the eighteenth century, what have we to realise? It was not for lack of births that the country failed to gain in population. They were days of large families. What became of the children? The answer is that they died because there was not means to keep them alive.

In the second half of the eighteenth century when population grew apace, there were not more births in families than before, but what happened was that there was an increased production of wealth to keep the children alive. Even so, the death-rate remained at what seems to us in our day a terribly high rate. It is necessary to see the matter in true perspective, and to realise that the high death-rate of the early days of the factory system was a low death-rate for the period before we engaged seriously in industry.

Let us add to the population figures already

given the record of the growth of the townships of Manchester and Salford as collected by Porter in that remarkable work, *The Progress of the Nation*, which, published in 1847, reviewed what seemed to the author—and not without reason—a period of national advance. Here are the striking figures :—

GROWTH OF MANCHESTER AND SALFORD

Year	Population	Increase
1801 ..	95,000 ..	—
1811 ..	116,000 ..	22 per cent.
1821 ..	162,000 ..	39½ „
1831 ..	238,000 ..	47 „
1841 ..	353,000 ..	48½ „

Those who imagine that as the British population came to be increasingly engaged in machine industry it suffered in lives, should reflect that these remarkable advances were made not so much because more children were born as because fewer children died. Indeed, as England advanced in industry by leaps and bounds, widening with every year in this respect the gulf between herself and foreign nations, her death-rate fell as compared with that of foreign nations.

The true philosophy of the matter may be

readily grasped by considering the enormous growth of sparrows, which has become almost a plague in the country. The birds have not increased because sparrows have larger families than was previously the case. These creatures increase as they do because they find artificial food and shelter in our towns and are thus kept alive. The death-rate of the sparrows has gone down through man's agency, and therefore they multiply apace. We kindly provide them with ever-increasing means of subsistence, and in effect we produce them. Thus it was with the growth of the English population as coal was increasingly used. The coal produced the means of subsistence, and children lived where before-time children died.

In so far as we are able to measure the growth of our industries by production, or by materials used, we see clearly how it became possible for more children to be kept alive. Thus, with regard to the all-important iron trade, the key to manufacturing progress, because of the indispensable character of the metal, we have available the following estimates of production drawn from various authorities of

13668

repute as to the production of pig-iron in Great Britain :—

BRITISH PRODUCTION OF PIG-IRON

Year	Tons
1740	17,000
1788	68,000
1796	125,000
1802	170,000
1806	258,000
1825	581,000
1830	653,000
1835	1,000,000
1840	1,500,000
1847	2,000,000
1854	3,070,000
1862	3,900,000
1870	6,000,000
1880	7,700,000
1890	7,900,000
1900	9,000,000
1910	10,000,000
1912	8,800,000

At the first date given, 1740, Britain imported much more iron than she herself produced; the country with such extraordinary natural capacity for iron manufacture, having coal, iron-ore, and limestone near to each other and near to the sea, had not yet learned the secret of her future greatness. At the second date given, 1788, the smelting of iron with coal fuel had been in use for some

thirty years, and British iron production had consequently quadrupled. From this time onwards the advance continued at an accelerating pace, until in 1862 we were producing nearly 4,000,000 tons of iron per annum. Whereas a century before we were importing more iron than we produced, we had reached a point at which we were producing more iron than all the rest of the world put together :—

THE WORLD'S IRON PRODUCTION, 1862

	Tons	Tons
Britain		3,900,000
France	1,000,000	
U. S. A.	700,000	
Germany	500,000	
All other countries (about)	1,400,000	
		3,600,000
All the World		7,500,000

Great Britain, which in 1750 had been an agricultural country with only about 7,000,000 of people, had thus swiftly mounted to the virtual command of the world's industry, and it had attained to a population of 23,000,000. For a further period of some twenty years the British iron trade was destined to make

an extraordinary advance. By 1870, another 2,000,000 tons was added to the actual output. A decade later, in 1880, there was

THE WORLD'S PIG-IRON OUTPUT

Year	Estimated Total Output of Pig-Iron in the World	Of which there was produced (in Millions of Tons)				
		In the United Kingdom	In the United States	In Germany and Luxemburg	In France	In the Russian Empire
1880	18·2	7·7	3·8	2·7	1·7	0·4
1885	19·5	7·4	4·0	3·6	1·6	0·5
1890	27·5	7·9	9·2	4·6	1·9	0·9
1895	29·0	7·7	9·4	5·4	2·0	1·4
1900	40·5	9·0	13·8	8·4	2·7	2·8
1905	53·5	9·6	23·0	10·7	3·0	2·7
1906	58·5	10·2	25·3	12·1	3·3	2·6
1907	60·2	10·1	25·8	12·7	3·5	2·7
1908	48·2	9·1	15·9	11·6	3·3	2·7
1909	60·0	9·5	25·8	12·4	3·6	2·8
1910	65·5	10·2	27·3	14·6	4·0	3·0
1911	63·0	9·5	23·6	15·3	4·4	3·5
1912	72·0	8·8	29·7	17·6	4·9	4·1

It will be seen that in 1912 Britain produced 8,800,000 tons of pig as compared with the 7,700,000 tons of 1880. True, there was a great coal strike in 1912, but in 1911 the production was no more than 9,500,000.

recorded a further advance to 7,700,000 tons. After that, comparatively small progress was made, the output reaching 10,000,000 tons, and stopping in a curious way round about

that figure. The stagnation of the British iron trade is unsatisfactory.

Between 1880 and 1890 the United States and Germany began seriously to work their wonderful coal and iron resources, and although in 1885 Britain produced as much iron as the United States and Germany put together, five years later the United States alone had easily beaten the British output. To-day, Britain ranks third amongst the iron producers, as will be gathered from the comparative table, p. 43, which shows how rapidly the relative positions of the iron countries have changed in recent years.

The available figures relating to the British consumption of raw cotton also exhibit the rapid movement of industry at the end of the eighteenth century.

BRITISH CONSUMPTION OF RAW COTTON

	Million Lbs.
1785	18
1790	31
1801	54
1811	90
1850	663
1870	1,101
1900	1,544
1910	1,717
1911	1,916

In the sixteen years which ended in 1801, the cotton mills trebled their consumption, and in the first decade of the nineteenth century they nearly doubled their consumption. By 1850, the figure had reached 663,000,000 pounds, and in the course of the next twenty years this was nearly doubled. Thereafter, progress in consumption was comparatively slower, although still wonderful, and it should be observed that the consumption figure for the later years does much less than justice to the British cotton trade's continued advance, for Lancashire has increasingly spun fine yarns, which means, of course, that a given quantity of cotton has come to produce a much greater value in output. It is a notable thing that the British cotton trade has not suffered the partial stagnation in recent years which has marked the British iron trade.

Turning to what is now our second greatest textile industry, the woollen and worsted trade, we come to an industry with which the commerce of England has ever been greatly concerned. Before the coal period England was a great producer of wool, and she freely exported the raw material. The

manufacturers of the Continent of Europe looked to England for their material, and knew much better what to do with it than we did. The use of coal wrought an extraordinary change in the situation. It is true that we still export small quantities of British wool, but our imports of the material have become overwhelmingly greater than our total home production.

The following statement, which is taken from the official compilations of the Bradford Chamber of Commerce, will show clearly what the Industrial Revolution did for the British woollen industry :—

WOOL USED IN BRITISH WOOLLEN AND WORSTED INDUSTRIES

The figures include hair, but not shoddy.

Year	Imported Wool	Native Wool	Total
	Lb.	Lb.	Lb.
1775	2,000,000	80,000,000	82,000,000
1800	10,000,000	100,000,000	110,000,000
1875	200,000,000	151,000,000	351,000,000
1900	382,000,000	116,000,000	498,000,000
1910	506,000,000	106,000,000	612,000,000
1913	537,000,000	96,000,000	633,000,000

So rapidly did British wool consumption

advance, that the country which had so recently supplied raw material to the Continent, imported 2,000,000 pounds of wool in 1775, and in the opening years of the nineteenth century the imports had grown to 10,000,000 pounds a year. By the eighteen-sixties home grown wool sufficed to serve about one-half of our consumption, and in the eighteen-seventies our work in wool was chiefly done upon imported material. Again the table gives us a picture of continuous advance, the total consumption figure in 1913 amounting to 633,000,000 pounds. The advance of United Kingdom wool consumption in the twentieth century is a fact upon which the British woollen and worsted trades may be heartily congratulated.

Before the coal and iron trades rose to prominence the use of timber was an excellent guide to national prosperity, and still the figures relating to the consumption of timber are of importance, as exhibiting in some measure the advance of building construction. Porter, in his *Progress of the Nation*, gives the following table, showing the quantity of imported timber used in the United Kingdom in 1801 to 1845 :—

BRITISH TIMBER CONSUMPTION—1801-1845

	Loads
1801	162,000
1811	279,000
1821	417,000
1831	546,000
1841	745,000
1845	1,079,000

Here we see that in forty years the use of timber in the United Kingdom increased nearly sevenfold. We have no later figures which are strictly comparable with these, but in 1851 our total imports of timber amounted to over 2,000,000 loads, and in 1861 to over 3,000,000 loads :—

BRITISH IMPORTS OF TIMBER—1851-1912

(Exclusive of Furniture Woods, Etc.)

	Loads
1851	2,112,000
1861	3,040,000
1871	4,601,000*
1881	5,664,000
1891	6,760,000
1901	9,194,000
1911	9,462,000
1912	9,774,000

*As from 1871 the figures contain some items not previously included, but the comparison is not greatly vitiated thereby.

It is a very striking thing that we now use fifty times more timber than at the beginning of the nineteenth century, and that in spite of the fact that we do not use timber for fuel. We may remind ourselves in this connection that if the amount of iron produced in the United Kingdom to-day were smelted with charcoal, the whole of the area of the British Isles, if devoted to timber-growing, would not suffice to supply the necessary fuel. Curiously, the use of coal has increased and not decreased the use of timber. By multiplying population and increasing wealth, it has created the enormous call for wood which is exhibited in the above figures.

Having given the available evidence with regard to four great industries, in respect of production as measured by actual output or use of material, we may usefully turn to the available records of our external commerce in the eighteenth century and the first half of the nineteenth century. The deeply interesting table which is given on p. 51 is based upon the information given in Pittar's invaluable *History of the Customs Tariff of the United Kingdom.*

The nature of the table must be carefully

explained. In the first place, the figures for 1700 to 1778 inclusive refer to England only, but exclude her trade with Ireland. For 1779 to 1800 the figures refer to Great Britain, excluding trade with Ireland. From 1801 onwards the figures represent the trade of the United Kingdom as a whole. In the second place, the figures given, headed with the familiar £, do not represent the real values of the goods exported. They represent 'official' values, based upon the old Customs valuation of goods as laid down in the books of Customs Rates of Charles II. and George I. This fact does not, however, render the figures useless, for a moment's consideration will show that, as they are all based upon the same artificial valuation, they represent the movement of our trade *by quantities or volume.*

Taking the statement, therefore, to be a fairly reliable guide to the progress of the volume of goods imported and exported—we say fairly, because it must be remembered that a good deal of human imperfection attaches to such accounts, especially in the early days of statistical science—we have a most interesting and illuminating statement before us.

IMPORTS AND EXPORTS—1700 to 1853

NOTE 1.—For 1700 to 1778 the figures refer to England only—trade with Ireland not included.
For 1779 to 1800 the figures refer to Great Britain—trade with Ireland not included.
For 1801 to 1853 the figures refer to the United Kingdom.

NOTE 2.—The Values are not the real values of the goods but Official Values (see text); the figures are, therefore, an index to quantities and not to values.

For England only	Imports £ (nominal)	Exports £ (nominal)
1700	5,700,000	6,200,000
1710	3,700,000	6,000,000
1720	5,800,000	6,600,000
1730	7,500,000	8,000,000
1740	6,300,000	7,600,000
1750	7,200,000	11,400,000
1760	8,900,000	13,600,000
1770	11,000,000	12,100,000
1778	8,900,000	10,100,000
For Great Britain		
1779	9,900,000	11,900,000
1780	9,900,000	11,400,000
1790	16,400,000	17,600,000
1800	28,300,000	34,400,000

For United Kingdom		Exports of British Produce	Exports of Imported Goods
1801	31,800,000	24,900,000	10,400,000
1810	39,300,000	34,100,000	9,500,000
1820	32,500,000	38,400,000	10,600,000
1830	46,300,000	61,200,000	8,500,000
1840	67,500,000	102,700,000	13,800,000
1850	100,500,000	175,400,000	21,900,000
1853	123,100,000	214,300,000	27,700,000

We see that in the first forty years of the eighteenth century trade was almost stagnant, and that it improved as from about the middle of the century and made rapid headway towards the end of the century. In the first half of the nineteenth century there was further very considerable improvement, the rise in the volume of trade, which had been excellent after 1820, becoming marked after 1840. In 1853 the volume of imports was twice as great as it was thirteen years before, while the volume of exports more than doubled.

Here the Free Trader sees the influence of the reform of the Customs tariff, which began with the simplification of the absurd old Customs laws by the Customs Acts of 1825 and 1833, and was seriously continued in 1842, when many prohibitions were removed and duties relaxed. 1845 and 1846 saw the great Free Trade Acts, and the Finance Bill of 1860 completed the work.

It is not the province of this volume to discuss tariff policy, but it may be remarked in passing that to a country like this which, as we have seen, has one great natural asset, coal, and which, as we shall see presently, is

badly found in other materials, it seems an obviously wise policy to make our island nation a great free port and thus secure all the world's materials to work with British coal and British labour.

Having examined the movement of British trade by volume between 1700 and 1853, I next give a statement of the movement of British commerce by values as far as it has been recorded. The real values of exports were recorded as from 1805, and the real values of imports were recorded as from 1854, and the figures for decennial periods are given in the table on p. 54.

It will be seen that in the years in which the figures in the table on p. 54 refer to the same years as those in the table on p. 51, they appear to have no relation to them. That is because, as already explained, the figures on p. 51 relate to official and not to real values. Prices fell greatly throughout the nineteenth century, until nearly its close. It will be seen that in the period 1805 to 1850 British exports, as expressed in values, rose. As at the same time prices were falling, it follows that the quantity of trade done very greatly increased, and that is the fact expressed

UNITED KINGDOM COMMERCE

EAL VALUES OF IMPORTS AND EXPORTS

NOTE.—Imports are valued c. i. f., or inclusive of freight and insurance charges. Exports are valued f. o. b. (free on board) at British ports.

Year	Imports	Exports of British Goods	Exports of Imported Goods
	Million £	Million £	Million £
1805	Value not Recorded.	38	Value not Recorded.
1810		48	,,
1820	,,	36	,,
1830	,,	38	,,
1840	,	51	,,
1850	,,	71	,,
1860	210	136	29
1870	303	199	44
1880	411	223	63
1890	421	263	65
1900	523	291*	63
1910	678	430	104
1912	745	487	112
1913	769	525	110

* From 1900 onwards the figures include value of new ships, not previously recorded.

in the figures on p. 51, which therefore confirm those of the second table.

The table is continued down to the last year (1913) for which complete figures are available as I write, and it will be seen what a great advance British commerce has made in the twentieth century, after a period of comparatively slow advance in the closing decades of the nineteenth century.

It is a curious fact, and one forgotten by all but close students of our commerce, that while British prosperity, as we have shown, is based upon British coal, coal producers for many years deliberately limited the production and sale of coal. Between 1771 and 1844 what was called 'the limitation of the vend' existed. Coal producers combined to limit output, and not to ship more than an agreed quantity of the invaluable product. The anti-national character of this combination of capitalists was further accentuated by the fact that the limitation only applied to coal for home use.

In these circumstances it was fortunate for British trade that the exportation of coal was then a difficult matter, and that, for reasons which will be explained hereafter, it is difficult

to sustain industry on imported coal. The limitation of the vend is, of course, but a striking illustration of that frustration of production which is an unfortunate result of commerce inspired by the conception not of supplying for use but of supplying for profit. It was in the teeth of the limitation of the vend of coal that British industry progressed, and its effect was to rob the country of part of the advantage conferred upon it by the scientific men who had shown us how to work coal. We had the British inventors and engineers providing the means to give wealth, and commercial men actually limiting the supply of those means to the nation. The possession of coal, however, was too great an asset for even the commercial mind to destroy.

Such, in brief, are the outlines of the rise of Britain to a position which, when contrasted with that which obtained one hundred and fifty years ago, or even one hundred years ago, is one of great affluence.

CHAPTER III

THE NATIONAL ECONOMY

If we take stock of the natural assets of the United Kingdom apart from coal, we are struck with their extreme paucity. The area of the British Isles is no more than 121,000 square miles, which may be compared with the 209,000 square miles of Germany, the 207,000 square miles of France, or the 2,974,000 square miles of the United States of America. The greater part of our area is put to use, if not to full use. Of the 77,000,000 acres of the United Kingdom, about 48,000,000 acres, according to the returns of the Board of Agriculture, are cultivated, rather more than one-half being permanent pasture. For the rest, there are about 1,000,000 acres of inland waters, about 3,000,000 acres of woodlands, about 13,000,000 acres of heathland and mountain, about 1,500,000 acres of Irish bog and marsh, and the remainder, between 10,000,000 and

11,000,000 acres, is either barren or accounted for by towns, villages, railways, roads, parks, gardens, etc.

It is probably true that the agricultural produce of the nation could be considerably increased, but in this connection we have to remember that we have available, as Continental countries through their protective systems have not available, the cheapest and best food grown in all the world, with nothing standing between us and it but the cost of bringing it to this country, plus the middlemen's charges which are common to both home-grown and imported food.

When allowance is made for this, however, there seems no reason to doubt that, with an agriculture conducted on more scientific principles, the agricultural product could be enlarged. Its actual size is commonly underestimated. The general conception is that we import nearly all the food we eat. This is true of corn, but it is not true of our food as a whole, the actual facts of the case being that of such foods as can be grown in our climate, we produce about one-half on our own soil.

Afforestation has been sadly neglected in

the United Kingdom. In the old days the forests of England were destroyed in a vain attempt to maintain an iron industry, and the waste has not been replaced. No other country in Europe has so small a proportion of its area devoted to timber. There is no doubt whatever that a considerable part of the millions of acres of heathland and waste to which we have referred could be profitably devoted to sylviculture, and a Royal Commission on the subject in 1908 reported very strongly in favour of national effort in the matter. The report has been pigeon-holed, however, and the years go by with little or nothing done in the matter, as though we were not aware of the enormous need for timber shown by our imports.

It is our own fault if we lack timber, but that is not true of many other most important foods and materials. Such exotic things as tea, coffee, cocoa, maize, bananas, oranges, lemons, etc., are now in common use, and deemed indispensable. Some promising experiments have been made in sugar and tobacco growing, but for our main supplies of these we continue to look to oversea commerce.

As to raw materials, our position is far worse than in regard to foods. It is a very small fraction of British work which is done upon British raw materials. The only industrial metals which we possess in considerable quantities are iron and tin, but even as to these we find it necessary to make great imports. About one-third of the iron-ore we use comes from abroad, and, moreover, the ores we import are very much richer than those produced from our own mines. It appears that about one-half of our production of pig-iron is from foreign ore. As to tin, also, the mines of Cornwall are still rich, although so many centuries have elapsed since the Phœnicians traded here to obtain that metal, but the greater part of the tin we use is obtained from the Straits Settlements.

As for other metals, our mines are so poor that their yearly output here is a negligible fraction of our requirements. From our native ores we produce annually no more than about 500 tons of copper, 5000 tons of zinc, and 20,000 tons of lead. These figures are so small that if the British production of copper, zinc, and lead entirely ceased the

statistics of the world's output would remain for practical purposes unaltered.

Here is a brief statement of the relation of the production of British native metals to the production of the world as a whole :—

A YEAR'S PRODUCTION OF METALS (1911)

(The United Kingdom figures represent the amount of British production *from native ores*.)

(Metric tons of 2204 lb.)

Metal	United Kingdom	The World
	Tons	Tons
Iron	5,100,000	63,000,000
Copper	400	931,000
Zinc	6,000	924,000
Lead	18,000	1,112,000
Tin	5,000	116,000

It is quite clear from this statement that if the British metal industries were limited to the use of British native metals they would necessarily be a thing of insignificance in the world of work.

Even worse is the British position with regard to the raw materials of the important textile trades. Nature forbids us to

grow cotton, or hemp, or jute, and it is difficult for us to produce silk. We grow a little flax, but not nearly enough for our requirements.

As to wool, we have already explained the position (p. 46), and the proportion of home-grown wool must necessarily continue to diminish as population increases and the standard of life rises. When we turn to miscellaneous raw materials, we find ourselves wholly or mainly dependent upon imports for all things apart from limestone, slate, granite, clay, and gravel. India-rubber, gutta-percha, ivory, asbestos, mineral oil, vegetable oil, fats, gums, hides, skins, furs, bristles—these and many other things that might be named are entirely, or almost entirely, derived from our oversea commerce. *Ever we are using more of these things, and ever, therefore, our dependence upon foreign commerce is increasing.* And it is a dependence which no human effort can alter.

In 1900 our imports of raw materials for home use, as classified by the Board of Trade, were valued at £139,000,000; in 1910 this figure had risen to £198,000,000; and in 1913 to £218,000,000. These figures by no means

exhibit the extent to which we have to look to foreign trade for the means of work, for the Board of Trade's 'raw material' classification does not include such things as crude copper, crude tin, crude lead, yarns, undressed leather, etc., which are classified as imported 'manufactures.'

In such circumstances it is a wonderful thing that so small a country is able to sustain 46,000,000 people in 1914. And amongst the many indictments that may be alleged against our educational system, I know of none greater than that not one in a thousand of the children who have passed through our elementary or secondary schools could give an intelligent explanation of how it is that in such circumstances our population exists.

We have said that coal is the key to modern British wealth. Let us now see why it is that the possession of this mineral gives us exceptional advantages, and why those advantages cannot be shared by nations which either lack coal or possess inferior supplies.

Because coal is a bulky and weighty substance it is costly to transport, and its

cost, therefore, rapidly increases at each remove from its place of production. It follows that coal can only be economically employed at or near coal mines. It is, as a rule, more costly to take coal to raw materials than to take raw materials to coal. Hence coal becomes a magnet for raw materials, and industries gravitate to coal mines.

That is why countries which possess coal have an extraordinary advantage over countries which possess it not. Coal-less nations cannot import coal and with it carry on industry competitively with the nation from which they have to buy fuel. It is not possible for Spain or for Italy, Spain having very little coal and Italy having none, to import coal from England and with that coal to compete with England.

Although these explanations may seem simple enough when stated, it is unfortunately true that many people are not acquainted with them. I remember that at the time of the great coal strike of 1912, a well-known financial and commercial writer wrote an article, and persuaded a leading newspaper to publish it, in which British miners

were told very gravely that it was useless for them to strike because we could easily carry on our industries with coal imported from abroad. The fact that such an article could be written, and that the editor of a great newspaper could be found to publish it, throws a curious light upon the equipment which is sometimes brought to the consideration of public affairs.

So true is it that industries are most economically carried on near coal that even in such a small country as the United Kingdom we find the industries chiefly clustered round the coal-mines. The china and earthenware industry has its seat, not near the source of the clay in the South-West of England, but in Staffordshire, near coal, the clay going to the coal and not the coal to the clay. For the same reason shipyards have disappeared from the Thames, because they cannot compete with those at ports near coal.

For the same reason Ireland remains a poor country. For the same reason parts of England and Scotland which are at any great distance from coal (unless, of course, they are near good ports) are poor. Norfolk,

Oxfordshire, Wiltshire are examples of counties where wages are very low. It is found on examining agricultural wages that they are several shillings a week lower in places far from coal than in places near coal, the reason being that as coal creates industries it creates in counties which possess it a demand for labour, which compels farmers to pay higher wages.

Not only British industry but British shipping has gained enormously by virtue of coal.

The rise of the steamship made it necessary to take coal to convenient places abroad for coaling purposes, and thus a great British export coal industry grew up, ever expanding with the increase of steam shipping. It is this fact which largely accounts for the extraordinary growth and prosperity of the British mercantile marine.

To make this point clear it is necessary to refer to the characteristics of British commerce. As we have indicated, we have cause to import enormous quantities of food and raw materials—commodities which are usually either bulky or weighty. To bring our necessary imports to our shores, therefore, clearly

demands an enormous amount of ship space. Turning to our exports, we find that they chiefly consist of manufactured articles, for we have little or no food or raw material that we can spare to ship abroad.

Now, manufactured articles have little bulk or weight in proportion to value as compared with foods and raw materials. Hence, it follows that to ship our exports abroad does not call for a great deal of ship space. Therefore, we have a picture of a country importing goods which call for many ships and exporting things which call for comparatively few ships. Such a position means unprofitable shipping because, of the ships bringing food and raw material to our shores, a considerable proportion would have to go out from our ports with ballast for a cargo, for lack of a better one.

Fortunately for British shipowners, our exports of coal provide just that bulky and weighty outward cargo which is necessary to balance our bulky imports. Coal comes to the rescue and makes it profitable to work our ships both inwards and outwards.

And our outward coal cargoes benefit more than our shipowners, for if they did not exist,

our inward cargoes would have to pay the cost of working the vessel both ways. The freight charges for our huge imports of food and raw material would be very much greater but for the fact that we have coal to export.

Again we see coal playing a decisive part in British prosperity. The British mercantile marine owes its present magnificent dimensions partly to our free import system and partly to the economy of coal, and the gross earnings of our mercantile marine are probably not less than £120,000,000 per annum. That is to say, £120,000,000 worth of our imports, or a large proportion of the value of the raw materials which we require to carry on our industries are earned by the services of our ships.

We have indicated broadly that three countries, the United Kingdom, the United States, and Germany, dominate industry by virtue of coal resources. The facts of the case are so remarkable that they easily form the most important statistical record connected with practical economics, and we give them in the following table, based upon the official records of the various countries :—

WORLD'S PRODUCTION OF COAL (1911)
(including lignite)

	Tons
United Kingdom	272,000,000
United States of America ..	443,000,000
Germany	231,000,000
United Kingdom, United States, and Germany together ..	946,000,000
All the rest of the world ..	194,000,000
Total	1,140,000,000

It will be seen that all the rest of the world put together does not produce one-fourth as much coal as is produced by Britain, America, and Germany. These three countries rule industry by virtue of one fact, and one fact only—that they produce nine out of every eleven tons of coal produced by all the world.

We are now in a position to realise the practical working of the British national economy.

The United Kingdom is a small country which has an excellent geographical position at the ocean gate of Europe, which has a fine seaboard, but which has one and only one great natural gift—Coal. If we depended upon agricultural work, these islands could not house, at the standard of living which now obtains, more than 15,000,000 to 20,000,000

people, if as many. The subsistence of the greater part of our enormous population is gained by employing power raised from British coal upon materials drawn freely from every part of the world.

Materials are imported and worked upon, and the resulting produce is partly consumed at home and partly sold abroad in exchange for food, materials, and manufactures. Our economy is such that it is absolutely necessary to earn imports to atone for our lack of natural resources. We chiefly earn those imports by exporting goods, but, as to a part, we earn them by the services of our ships and by lending capital to places abroad.

A concrete account of the working of this economy in 1913 may usefully be given—see opposite page.

We see that in 1913 British imports reached £769,000,000, and that of these imports £109,600,000 were re-exported in the merchant trade (this is sometimes called our entrepôt trade), so that imports for home consumption amounted to £659,400,000. In addition to exporting £109,600,000 of imported merchandise, we exported £525,500,000 worth of British produce and manufactures, chiefly

manufactures. Our total exports amounted in value to £635,100,000, as compared with our total imports of £769,000,000. Our imports of goods thus exceeded our exports of goods in value by £134,000,000.

ANALYSIS OF BRITISH COMMERCE IN 1913

(In millions of £).

Category	Total Imports	Exports		
		of British Produce	of Imported Goods	Total
Food (& tobacco)	290·4	32·6	15·9	48·5
Raw materials ..	281·9	69·9	64·1	134·0
Manufactures ..	193·6	411·6	29·5	441·1
Miscellaneous ..	3·1	11·4	0·1	11·5
Total	769·0	525·5	109·6	635·1

This 'balance of trade,' as it is sometimes called, is easily explained. As we have already seen, we have a mercantile marine whose gross earnings amount to not less than £120,000,000 per annum. The British investments in places abroad earn about £200,000,000 per annum in interest, so that between our shipping and foreign investments we have the

call upon the world annually for perhaps £320,000,000 worth of imports in addition to the imports earned by the exportation of goods. As in 1913 our imports exceeded our exports by no more than £134,000,000 it is clear that we did not import all we used upon commodities that we had power to import, and that means that a large part of the interest earned on oversea investments was left abroad and re-invested.

The sum of the whole matter is that in a very peculiar degree the British national economy rests upon the power to earn imports by work done for people in places abroad, and that that power in its turn is based, and for the present at least securely based, upon the peculiar fitness for industrial work involved in the possession of exceptional power supplies, aided by access to all the world's materials.

CHAPTER IV

THE BRITISH PRODUCTION OF MATERIAL WEALTH

We have seen that the United Kingdom is peculiarly fitted by Nature to be a great workshop. It possesses the first requisite of successful large scale production—viz., Power. What does it produce?

Until recently we could give no more than a vague answer to this question. We knew that our total production of material commodities was necessarily something very much smaller than the total National Income—the aggregate, that is, of all the incomes, large and small, of the people of the United Kingdom, because the National Income measures not only the income in goods, but income in services. The passing of the Census of Production Act in 1906, and the excellent work of the Board of Trade in carrying out the provisions of that Act, make it possible now to state the value of British

production within the limits of a very small margin of error. The importance of an inquiry into production can scarcely be overstated, for it is only upon a successful production that a nation can found a stable condition of wealth.

We can imagine a nation with a favourable geographical situation acting as middleman in the commodities produced in a considerable region of the world, and waxing rich solely or mainly by commerce, its production being limited to the local trades of building, clothing, food preparation, etc., called into existence by the necessities of its traders and those dependent upon them. Indeed, we need not cudgel our brains to imagine a thing which has prominently existed in the world. The concrete case of Venice shows how a great state may flourish for long upon trade and trade only. Venice, as the middleman of the East, rose to be a world power, but when she ceased to be a main gateway of the sea her power departed. It was an intrinsically unstable national economy.

Britain has an excellent geographical position, but she would be unwise to regard herself as a 'nation of shopkeepers.' In spite of the

Napoleonic gibe, it was not by shopkeeping that Britain rose to wealth, as we have seen in these pages. The development of the late eighteenth century was due, and solely due, to a production soundly based upon the possession of a magnificent source of power, a source which, for reasons already explained, could not be transmitted to others.

When, therefore, we inquire into the nature of the production of the United Kingdom, we are investigating facts of the greatest moment to the nation, and we must regard it as unfortunate that it was not until so late a date as 1906 that a British Government was sufficiently alive to its responsibilities to empower a State Department to make such an inquiry officially and to arm it with compulsory powers.

Even so, we have to note with regret that the House of Commons could not be persuaded to add a compulsory investigation of wages and of capital, and, writing in the year 1914, we find ourselves with only vague estimates of the amount of capital engaged in British industrial production. It should be added that the Census of Production Act covered mining and manufacturing, but it did not

cover agriculture or fisheries. Lacking compulsory powers, however, the Board of Agriculture carried out a voluntary census of agricultural production for the year 1908 with good results, and we are therefore able to make a complete estimate of the production of material wealth in the United Kingdom for *circa* 1907.

In estimating the value of the production of the industries of a nation, the main difficulty which presents itself is not the obtaining of data, but the fact that, as industries are interdependent and use each other's products as materials, a considerable amount of duplication is involved in the aggregates arrived at. The value of the same product may appear not only in duplicate, but five or six times over.

Take, for example, iron. The iron ore appears first in the value of the output of iron ore mines. The ore is purchased by the iron smelters, and when the value of pig-iron is returned, that value includes the original value of the iron ore counted a second time. The pig-iron is converted into steel, and when the value of the steel is returned it contains the value of the original iron ore

for the third time, and so the process may go on; the iron ore appearing for a fourth time, perhaps, in the value of armour plate, and for the fifth time in the value of a ship.

In this fashion the value of coal also runs right through these processes, appearing only once less than the iron ore. Similarly, cotton-spinning and manufacturing in this country are two distinct trades, carried on, as a rule, by different firms. Cotton yarn, the finished product of the spinner, is returned to the Board of Trade as worth so much. The cotton manufacturer buys and weaves, let us say, calico. He returns the value of that calico, and in it the value of cotton yarn appears a second time.

Bearing this in mind, let us approach the Board of Trade figures. The officials issued schedules to all occupiers of factories and workshops, mines, and quarries, builders, contractors, railways, tramways, harbours, docks, canals, local authorities, public utility companies, and so forth, in the United Kingdom. Only persons in a small way, working on their own account, occupiers of domestic workshops, mere mixers and blenders of commodities

engaged in quasi-productive work incidental to merchanting or retailing, were excepted. Firms were required to return not only the value of new work, but of repair and jobbing work.

From the schedules returned, the Board of Trade ascertained that the gross output of British industries in 1907 was worth in the aggregate £1,765,000,000. This term 'gross output' refers to an aggregate formed by adding together the separate outputs of each industry. It therefore includes that vast amount of duplication to which we have referred. The Board of Trade, however, asked each firm to state the value—(1) of the materials used by it, whether native or imported ; and (2) the value of work given out to other firms. By subtracting these items from the gross output of a trade the 'net output' for each trade was arrived at, this net output, it will be seen, representing the *value created by each industry and added to the materials which it used.*

With this explanation the reader will be able to follow the precise meaning of the table on pp. 80-81.

It will be seen that the figure for net output

is of very different dimensions from that of gross output. It amounts to no more than £712,135,000, thus :—

UNITED KINGDOM INDUSTRIAL OUTPUT, 1907

	£	£
Gross output		1,765,366,000
Subtract :—		
(1) Materials used	1,023,346,000	
(2) Work given out	24,885,000	
		1,053,231,000
		£712,135,000

It should be carefully observed that the values we are considering are the values of the goods at the places of production, *i.e.* they are the mine or factory prices of the products, and not the ultimate selling prices after they have been dealt with by middlemen.

An allowance has to be made for the fact that particulars were not obtained from little people working on their own account, as already indicated. The Board of Trade think that £50,000,000 is a fair allowance to make on this account, and that certainly appears to be the case. We therefore get :—

	£
Net Output according to returns received	712,000,000
Add for small producers not scheduled	50,000,000
Total	£762,000,000

UNITED KINGDOM MINERAL AND

Group of Trades	Gross Output — Selling Value or value of Work done (1)
	£
Mines and Quarries	148,026,000
Iron and Steel, Engineering, and Shipbuilding Trades	375,196,000
Metal Trades, other than Iron and Steel	93,465,000
Textile Trades	333,561,000
Clothing Trades	107,933,000
Food, Drink, and Tobacco Trades ..	287,446,000
Chemical and Allied Trades.. ..	75,032,000
Paper, Printing, Stationery and allied Trades	61,308,000
Leather, Canvas, and India-rubber Trades	34,928,000
Timber Trades	46,390,000
Clay, Stone, Building, and Contracting Trades	116,692,000
Miscellaneous Trades	8,288,000
Public Utility Services	77,051,000
Total	£1,765,366,000

INDUSTRIAL OUTPUT (1907)

Materials used — Cost (2)	Work given out — Amounts Paid to other Firms (3)	Net Output — Excess of Column (1) over Columns (2) and (3) 4
£ 28,495,000	£ —	£ 119,531,000
212,224,000	9,890,000	153,082,000
81,341,000	231,000	11,893,000
235,038,000	4,189,000	94,334,000
58,185,000	2,125,000	47,673,000
197,734,000	198,000	89,514,000
53,466,000	9,000	21,557,000
26,611,000	1,047,000	33,650,000
26,229,000	81,000	8,618,000
24,780,000	166,000	21,444,000
49,679,000	6,557,000	60,456,000
3,778,000	67,000	4,443,000
30,786,000	325,000	45,940,000
£1,028,346,000	£24,885,000	£712,135,000

This figure represents the values added to the materials, and all duplication has been eliminated. In eliminating duplication, however, we have taken out not only the materials and products bought by one British firm from another, but also the value of imported materials. The trade returns compiled by the Custom House show that in 1907 we imported for home consumption about £380,000,000 worth of raw and manufactured materials, which were worked up by British consumers, and which form part of column 2 in the table on p. 81. We have therefore to add this £380,000,000 to the £762,000,000 :—

	£
Net Industrial Output in 1907	762,000,000
Add Value of Imported Materials	380,000,000
Total	£1,142,000,000

One other addition has to be made. It is on account of the fact that imported materials, as well as domestic materials, before they reach the producer who uses them, are swollen in value by merchant's profits, railway freights, etc. For this factor, if we allow only 10 per cent. of the £1,053,000,000 of materials used, we have to add £105,000,000. Thus we get :—

	£
Total as last given	1,142,000,000
Add for profits and freights on all materials used (costs of producers, and part of factory value of products)	105,000,000
	£1,247,000,000

The student who desires to follow up the subject in more detail should obtain the Census of Production Report, Cd. 6320, in which the matter is dealt with in far more detail than is given here. In the survey just made the subject has been, of set purpose, stripped of all but essentials, and it is hoped that it will be of the greater assistance on that account, as it avoids burying the main features in a mass of minor considerations which really do not affect the broad facts of the case.

We have arrived, then, at a British industrial output worth £1,247,000,000 in 1907. This figure, it should be carefully borne in mind, represents the factory or mine output of the products concerned, and not their ultimate selling price to the consumers after they have passed through the hands of the middlemen. Further, it should be noted that this figure

represents much more than the value created by British producers, which we found to be no more than £762,000,000. It will be perceived that the £1,247,000,000 is made up of (1) £762,000,000, which is strictly the productive value created in this country; combined with (2) £380,000,000, being the value of imported materials; and (3) £105,000,000, being distributive costs of materials employed.

So much for industrial output. We now turn to agriculture and fisheries. With regard to the latter, the value of fish landed in the United Kingdom is returned as nearly £12,000,000 in the Annual Report for 1907 under the Sea Fisheries Acts (Cd. 4800). With regard to the former, as we have already remarked, the Board of Agriculture voluntarily conducted, without legislative powers, an agricultural census for the year 1908. Schedules were issued to all but occupiers of holdings not exceeding one acre, and replies were received from about one-third of those asked for information. Partly basing themselves upon the returns received, and making reasonable estimates where precise data were wanting, the following figures are officially

given as fairly representing the value of the agricultural produce of the United Kingdom, *considered as one farm*, with all duplications eliminated :—

AGRICULTURAL OUTPUT OF UNITED KINGDOM (1908)

	£
Food and Fodder, Flour, Seeds, and Plants	195,700,000
Horses and Animals not for Food	3,400,000
Hides and Skins	6,000,000
Wool	3,600,000
Timber	900,000
Flax	400,000
	£210,000,000

We are now in a position to form an estimate of the value of British material production of every sort and kind, and the following statement summarises all the factors that we have surveyed :—

BRITISH PRODUCTION OF MATERIAL WEALTH (1907)

As valued at places of production, and including value of imported materials embodied in the products

Products of	£
Industry (Mining and Manufacturing)	1,247,000,000
Agriculture	210,000,000
Fisheries	12,000,000
	£1,469,000,000

How are we to regard these figures? Is the total large or small?

To answer this important question with intelligence, it is well to relate British material production to external trade in order to arrive at the net value of the material wealth *available for consumption in the United Kingdom* in 1907. We can best do this by setting out a simple statement of the net output of British industry and agriculture and fisheries, and showing how it is swollen by imports brought into the country, and diminished by the exports which, as we have already explained, have necessarily to be sent out of the country to earn the imports without which our national economy would fail. This is done in the table on p. 87.

What is presented in this important statement is a near approximation to the net factory or port value of the material commodities acquired by the nation in 1907. It is a statement which is exclusive, be it observed, of all costs of distribution, whether of the distribution of materials between native producers or the distribution of imported foods or materials. The result, it will be seen, is to give a net gain in material wealth of

United Kingdom Increment of Material Wealth in 1907.

	£	£
Industrial Production, net value	762,000,000	
Agricultural Production, net value	210,000,000	
Fisheries Production, net value	12,000,000	
Total material Production net, exclusive of :— (1) Value of Imported materials, and (2) Distributive costs of materials		£984,000,000
Add: Imports into United Kingdom	646,000,000	
		£1,630,000,000
Subtract:—		
(1) Exports of British Production, £426,000,000		
(2) Exports of Imported Goods, £92,000,000		
	518,000,000	
Result: Net Gain of Material Wealth in 1907 ..		£1,112,000,000

£1,112,000,000. This, related to the 44,000,000 people of the United Kingdom of 1907, means a net increment of material wealth, clear of cost of distribution, of about £25 per head.

This £25 per head had to cover every sort and kind of material need. It had to serve, not only personal needs, but national needs and civic needs. It had to furnish not only material things for current consumption, but the material things necessary for the repair of existing capital, and the new capital required by all our national activities, whether in agriculture, in mining, in quarrying, in manufacturing, or in distributing, or in that city-making which is a collective thing, or in that home-making which is an individual thing.

The nation's ships, the nation's army material, the material required for national buildings and services such as the Post Office and the Customs, the municipal buildings and services of all sorts, from sewers to public libraries, the entire public utility services of the country, however owned, supplying the public with gas, electricity, water, petty transport, markets, etc., the railways and canals, the public roads, the docks and

harbours and lighthouses, the building and contracting trades, the iron and steel and other metal trades, plant for mining and quarrying, the textile industries, engineering, shipbuilding for the mercantile marine, glass, pottery, the clothing trades, the chemical trades, the paper and printing trades—all these had to draw upon a fund of material commodities worth no more than £25 per head, before there was anything left for personal consumption.

We are now much better able to form an idea as to the true character of the figures we have examined, and it is impossible to resist the conclusion that British production is wholly inadequate to meet the needs of so great a population, interpreting those needs in a most modest sense. We realise that, although the nation is rich as compared with the small and almost stagnant people of 1750, it is still actually poor.

A further most unfortunate consideration must be brought into our perspective. It is that the figures we have examined tell us nothing as to the quality of the products valued in the schedules returned to the Board of Trade. Those who desire enlightenment on that subject will not get it by reference to

any official publication. It will be necessary for them to acquaint themselves with the nature of the goods sold to the masses of the people. A survey of the shop windows in poor neighbourhoods, or of the houses which are built for the poor, reminds us that a large proportion of the total material output consists of rubbish.

It cannot be otherwise in existing circumstances, and manufacturers who cater for the masses of the people have necessarily to turn out such stuff as the mass of the people can afford to buy. The great majority of British adult working men earn less than 35s. per week, and a very large proportion of them less than 30s. It is but necessary to bear in mind how many needs have to be satisfied out of these sums—rent, rates, insurance, fuel, lighting, etc.—to understand how little there remains, even to the most careful, to spend upon miscellaneous commodities.

I recently made an estimate of what might be considered a reasonable poverty line, not based upon a workhouse dietary like the one got out by Mr Rowntree in his *Poverty*, but such a line as surely ought to be considered the minimum which the humblest family

should enjoy in view of the scientific means of wealth production which are now freely at the disposal of a civilised community, embodied in inventions and discoveries which are now common property, and for the most part uncovered by patents.

The position of our producers at this moment is this, that in fourteen years from this date every invention in aid of production which has ever been thought of by any man, living or dead, belonging to any nation, will be freely at the disposal of any one who cares to utilise it in this country. And as I write, in 1914, if the unexpired patents had to be dispensed with, the range of free invention is so enormous as to bestow upon us means which can only be described as magnificent.

I say that it is in view of these facts that we have to consider a poverty line. We are not living in the England of 1750, eighteen years before Watt took out his steam-engine patent. We are not in the England of 1800, at the time when Volta had but newly discovered the flow of an electric current between two different metals. We are at this hour the inheritors of a plenitude of discovery and achievement. If, then, we suggest the

following modest standard of comfort as a twentieth-century poverty line for an average family of two adults and three children, we may justly feel that we are not asking too much of modern production :—

A SUGGESTED POVERTY LINE IN 1914.

Per Week for	£	s.	d.
Rent and rates	0	7	6
Food	1	0	0
Clothing, including boots	0	5	0
Fuel	0	3	0
Lighting, furniture, ironmongery, crockery, soap, soda, etc.	0	3	6
Amusements, including holiday	0	1	6
Fares	0	1	0
Drink, tobacco, newspapers, books, and pocket money.	0	2	0
Trade Union, Friendly Society, etc. ..	0	1	6
	£2	5	0

Modest as the items are, including as they do an expenditure of no more than about 8s. or 9s. a week upon what may be called miscellaneous manufactures, the aggregate is 45s. a week, or £117 per annum. We know, however, that the average working man cannot earn money in every week in the year, and if we allow four weeks' loss of pay through unemployment, sickness, accident, holidays, etc., the earnings of £117 in

forty-eight weeks means that the workman must earn, when in work, over 48s. per week.

It is doubtful, however, whether as many as 750,000 adult working men in this country earn as much as 48s. a week, and it is clear, therefore, that modest as is the standard we have suggested as a poverty line, the great mass of the people of the United Kingdom are below it.

CHAPTER V

SOME STUDIES IN UNDER-CONSUMPTION

FROM our survey of the results of the Census of Production, it will be apparent that the British consumption of what a civilisation regards as essential commodities must be very small. Let us now examine several important trades to ascertain definitely what consumption amounts to.

Let us begin with the building industry, in view of its extreme importance, with the object of ascertaining what is added to the homes of the British people in a year. The Census of Production shows that in 1907, a year of good trade, the total output of buildings in the United Kingdom was as shown on p. 95.

It will be seen that more than one-third of the whole consisted of the value of the alterations and repairs done to existing buildings. The construction of new premises

amounted to something more than £40,000,000 and of this a considerable part is accounted for by the value of public premises and

BRITISH BUILDING OUTPUT IN 1907

	Construction	Alteration and Repair	Construction, Alteration, and Repair, not separately distinguished	Total
Buildings :—	£	£	£	£
Private Premises (Residential, Trade, or Business)	32,010,000	23,797,000	6,808,000	62,615,000
Public Premises	5,716,000	1,318,000	472,000	7,506,000
Places of Public Worship and Buildings connected therewith	1,536,000	544,000	188,000	2,268,000
Private Premises, Public Premises, and places of Public Worship not separately distinguished ..	116,000	55,000	888,000	1,059,000
Total	39,378,000	25,714,000	8,356,000	73,448,000

places of public worship. The value of new private houses constructed cannot be precisely distinguished, but it is clear that it is much less than £30,000,000. (See column 1.)

Indeed, in view of the fact that the total output of private premises for residence, trade, and business was £32,000,000, it can hardly be that the output of new private houses accounted for more than £20,000,000 of this. Thus we are driven to the conclusion that the construction of new houses for all classes in this country in 1907 amounted to no more than £20,000,000 for a nation of 44,000,000 of people—a people which, in the year 1907, had a natural increase in population of 470,000, diminished by about 200,000 emigrants, being a net increase of about 270,000.

The new houses built were worth 9s. or less per head of the population. That is an extraordinary indictment of production as it is. The addition to the population should have created a demand, if expressed at no more than £400 for each five persons, of nearly £21,000,000, to say nothing of the crying need to destroy great areas of existing brickwork and to replace them with decent habitations.

Or let us endeavour to form an idea of what the output of private houses ought to be in this country at the present time. Let us suppose that we were replacing our existing

urban houses at the rate of no more than 100,000 a year. There are about 9,000,000 houses in the country, so that, if they were replaced at the rate of 100,000 a year, it would take ninety years to rebuild the whole. If 100,000 new houses were erected in a year at a cost of £500 each—and at the price of materials in 1907 £500 was needed to construct a new well-built small house—the output would have been worth £50,000,000, or more than twice the actual output, not of little houses, but of houses of all classes.

It is admitted on all hands that the re-housing of the people is a vitally important problem. The facts that I have given show that, while the majority of our existing houses, not of the working classes alone, but of all classes, are at the best inefficient and ugly, and at the worst filthy and insanitary, we are advancing to a better condition of things at the inadequate rate of 9s. per head per annum. And even that 9s. expresses in many cases the erection of jerry-built rubbish houses.

Let us pass to the furnishing of homes.

According to the Census of Production, the United Kingdom, as a whole, in 1907 expended upon wooden furniture, cabinet-work, and

upholstery about £9,000,000, allowing for retail profit. This sum represents not merely the furniture sold for private houses, but all the furniture used in trade premises and offices, including hotels. It covers the total expenditure of all classes, rich and poor, from the millionaire to the poor young couple setting up in life by buying a home on the hire system. A proper allowance is made for the import and export trade. The British expenditure on furniture thus amounts to about 4s. per head per annum.

What a small thing the furniture trade is, and what a big thing it ought to be! Let us endeavour to draw a picture of a very moderate call for furniture and upholstery by our 9,000,000 families :—

A MODEST CALL FOR FURNITURE

	£
Group A. 1,000,000 families spending £10 a year	10,000,000
Group B. 2,000,000 families spending £7 a year	14,000,000
Group C. 6,000,000 families spending £5 a year	30,000,000
	£54,000,000

It is a poor enough estimate, for at this rate it would take many years to furnish decently

the houses of the United Kingdom. Yet it amounts to £54,000,000 as compared with an actual expenditure by all classes of about £9,000,000. Here we have before us in bulk and as a whole a picture of under-consumption which we can study in detail for ourselves any day by using our eyes in poor and even in middle-class neighbourhoods. To watch the removal of a poor family is to see the transfer of a wretched collection of dirty and decayed sticks and utensils, for the most part fit only for the rubbish-heap. A large section of the middle classes is in little better case, the furniture used being poor and uncomfortable, and undergoing rapid deterioration through those frequent removals which are a feature of modern urban life amongst our unsettled and homeless masses.

Next let us examine what may be termed our proudest and most successful industry, the cotton trade.

The Board of Trade deduce from the information afforded by the Census of Production that in 1907 the output of the cotton industry, eliminating all duplications, was worth about £132,000,000 (excluding lace, hosiery, etc.).

Making allowance for imports and exports, we get :—

BRITISH CONSUMPTION OF COTTON GOODS IN 1907*

	£
Total Output of Cotton Industry ..	132,000,000
Deduct Exports	105,000,000
	27,000,000
Add Imports	4,000,000
	£31,000,000

* Exclusive of such things as cotton lace, cotton hosiery, etc.

The total output of the British cotton trade is magnificent, but the greater part of it is exported. Those exports are invaluable to us, for they earn food and materials without which, as we have explained, the national economy would fail. The exports are not deprecated here, far from it, but how remarkable it is that the home market furnishes for the cotton industry no greater a call at wholesale prices than £31,000,000, a call which, in terms of retail prices, may be fairly put at about £40,000,000. At factory prices our people consume cotton goods at the rate of about 14s. per head per annum, and that covers some things which have been already expressed in our consideration of the

furniture trade, which uses cotton goods in its upholstery.

Suppose that an average family of five persons consumed no more than £5 worth of cotton goods per annum (taken at factory prices). The output for home account would then be worth £45,000,000. If, more reasonably, we consider a consumption of £2 per head per annum for all purposes, the home consumption of cotton goods at factory prices would be over £90,000,000.

Similarly, we may examine the woollen industry. The output of the woollen and worsted industries, eliminating all duplications and covering not only dress cloths but tapestries, plushes, flannels, carpets, rugs, blankets, etc., is estimated at about £65,000,000. From this we may deduce consumption as follows :—

BRITISH WOOLLEN GOODS CONSUMPTION IN 1907

	£
Output of Woollen Industry ..	65,000,000
Deduct Exports	23,000,000
	42,000,000
Add Imports of Goods ready for Consumption, say	8,000,000
	£50,000,000

The home consumption of woollen goods is seen to be £50,000,000 per annum, or under 23s. per head of the population in 1907.

If the home consumption of such goods was worth no more than £10 per family at factory prices, the trades concerned would be called upon for an output worth, in 1914, £90,000,000 for home consumption alone. If, more reasonably, we put the call at £15 per family, the trade would have an output of £135,000,000 for home account alone, and in addition to export trade. And this is really the lowest estimate that we ought to entertain as a modest woollen consumption in our day, in view of the vagaries of our climate and the varying need for woollen and worsted goods in so many different shapes.

Or take the glass trade. The value of British production in 1907, according to the Census of Production, was about £4,500,000. The exports were worth £1,400,000, and the imports roundly £3,000,000, raising the total consumption of glass to £6,000,000 at factory prices. When we remember that this figure covers glass for all purposes, including all that is used in building, in nursery gardening, for bottles, and everything of glass that is

required for domestic use, shop-window use, or for ornament, we have again a revelation of under-consumption which is accentuated by the fact that the products of the trade are exceedingly fragile and in constant need of renewal.

So we may proceed from industry to industry, finding in every case that the Census of Production reveals in gross and for the nation at large the poverty of consumption which we meet everywhere in detail. Reduced to terms of bare production, we see how little of material goods is yet produced for home comsumption in what is generally reputed to be a 'wealthy country.' We realise that present-day production, although great as compared with that which existed before the development of modern science, is trifling in relation to the powers of production which we possess.

It seems strange that a nation of 46,000,000 white people, furnished by Nature with one of the best power supplies in the world, and armed by Science with the means of using that power economically, should produce so little. Inquiry has shown us that the nation can only be deemed wealthy in a relative sense.

The Britain of 1914 is wealthy as compared with that of 1750, or 1800, or even 1850, or, as compared with a nation like Spain, which has the misfortune not to be gifted with a great native power supply. But if we set up the most modest scale of production as a standard of measurement, we are driven to the conclusion that the nation is still poor, and that what material wealth it possesses is the thinnest of veneers.

CHAPTER VI

THE NATIONAL DIVIDEND

In Chapter IV. we considered the value of British agricultural, mining, manufacturing, and fisheries production, and we have seen how inadequate is each production to meet the needs of our people. Let us now consider the National Income as a whole.

The National Income, or National Dividend, is the aggregate of all the incomes of one people. When we measure the national production we measure the output of all kinds of commodities, good and bad, useful and useless. When we measure the National Income we measure all kinds of incomes, earned and unearned. These incomes are drawn partly, of course, in respect of the material production which we measured in Chapter IV.

Very largely, however, incomes are drawn in respect of services, and only a part of those services contribute to the value of material

production which we have examined. A very large number of people are concerned in wholesale and retail distributive trades, and the incomes drawn by middlemen enormously enhance the values shown in Chapter IV. before the goods reach the hands of the ultimate consumers. The figure expressing the National Income tells us nothing as to whether these services are useful or useless, for the small income drawn by a redundant middleman figures in it as much as the services of a railway goods guard, who does the nation real service.

In addition to the distributive agents of all sorts, there are the incomes of professional men of many kinds, who give services in law, literature, music, painting, teaching, lecturing, singing, acting, and so forth. Many of these services are of the highest value to the nation, but not rarely the work of a professional man, although dearly paid for, is of no social service whatever, and has no real value to the community, as, for example, when a clever lawyer is employed to help wash in public the dirty linen of rich people. The services of the officers of the central and local governments also swell the total. These are necessary

to the general welfare. The number of State and Local Government 'officials' is, of course, very much less than the number of officials employed by private persons.

It is curious how much misunderstanding there is on this point. For example, if the Post Office were carried on as it might be carried on, as petty carriage throughout the country, by a large number of letter delivery companies, the number of 'officials' required to work the United Kingdom postal service would be many times as great as it is, since each company would need separate management, separate offices, separate clerks, separate agents, separate advertisements, and so forth. If such a condition obtained, the wasteful persons employed would not be termed 'officials.' When, however, we have a State postal service, economically managed with a much smaller number of 'officials' than private managements would require, we hear a good deal of the wastefulness of officialdom, a fact which goes to show how strong is the tyranny of words.

Life insurance is now carried on by a host of unnecessary and wasteful companies and associations, employing a great army of

unnecessary officials, whose work is of little social value, so that life insurance premiums are much higher than they ought to be. If life insurance were made a State business, and carried on economically without competition, the number of State officials employed would be large actually, but it would be small relatively to the number now actually required. Yet, if the proposition were made to establish State life insurance, there would immediately be a mistaken outcry about the creation of 'officials.'

Included also in the aggregate of the National Income are the services rendered by those who make a profession of amusing, whether as singers, actors, professional sportsmen, billiard players or markers, cricketers, cricket-ground attendants, golf professionals, golf caddies, etc. While it is difficult to say what is the precise value of these services to the nation, it may be claimed by those who contribute to social pleasure and amusements that, by adding solace to life, they contribute to the nation's real wealth, and render more capable for material production many of those engaged in it. There may, however, easily be two opinions about the value of a

great many of the amusements offered us by a considerable proportion of these professional persons.

It will be realised that the National Income is very much bigger than the value at places of production of the nation's material output, for it covers the incomes drawn both for the making of goods and for the rendering of services. In 1910, in the latest edition of *Riches and Poverty* (Methuen & Co.), the present writer made an estimate of the National Income, based upon (1) the income-tax; (2) an estimate of the incomes of wage-earners based upon the valuable wage statistics data of the Board of Trade; and (3) an estimate of those small incomes which are not drawn as wages, but which are below the income-tax limit of £160 a year.

The result was as follows :—

THE NATIONAL INCOME IN 1908

	£
(1) Persons with incomes which exceed £160 per annum ..	909,000,000
(2) Persons with incomes below £160 per annum :—	
(*a*) Persons earning small salaries, petty tradesmen, etc. ..	232,000,000
(*b*) The wage-earning class ..	703,000,000
	£1,844,000,000

According to this estimate, we see that the income-tax line of £160 a year is almost an equator of the National Income. Above £160 a year there is £909,000,000 worth of income, while below that figure there is £935,000,000 worth of income.

It is further shown that the distribution of this income was as follows :—

DISTRIBUTION OF THE NATIONAL INCOME IN 1908

	Number	Income
		£
Persons with incomes of £700 per annum and upwards and their families, 280,000 × 5	1,400,000	634,000,000
Persons with incomes between £160 and £700 per annum and their families, 820,000 × 5	4,100,000	275,000,000
Persons with incomes of less than £160 per annum and their families	38,500,000	935,000,000
	44,000,000	£1,844,000,000

There is thus an extraordinary error of distribution.

About one-half of the entire income of the United Kingdom is enjoyed by about 12 per cent. of its population.

More than one-third of the entire income of the United Kingdom is enjoyed by about 3 per cent. of its population.

Between 1908 and the year in which this book is written, 1914, the National Income has probably increased by about £250,000,000, so that in 1914 the National Income may be taken to be, roundly, £2,100,000,000. The character of the distribution is very much what it was in 1908. We have thus added to the picture of a poor production, which was exhibited in Chapter IV., a picture of ill-distribution of a poor production.

The National Income is large enough to abolish poverty, in the sense in which that word is generally used, as relating to a condition of insufficient supply of the first necessaries of life. On the other hand, it is equally clear that the National Income is not large enough, even if better distributed, to confer the conditions of a comfortable and cultured life upon the whole community. We have to aim both at a larger production of wealth and at a better distribution of the results of that production.

It is important to observe that the ill-distribution of wealth is partly responsible for

the poverty of actual production. When, as the result of industrial operations, a considerable part of the product of industry is drawn off to form the incomes of a comparatively small body of well-to-do persons, the result is (1) to stem the production of necessaries and to increase the production of luxuries; and (2) to stem the production of material commodities and to increase the production of services.

When the shareholders in an industrial business draw off from a year's operations of the business an income of, say, £200,000, that £200,000 is spent very differently from the manner in which it would have been spent if it had been distributed amongst those whose work created it. In so far as it is translated into a call for material goods, it in no small part stimulates, not trades of necessity, but trades of luxury. In so far as it is translated into a call for services it results in the calling out of trades of useful production, and the calling into trades of non-production, of a considerable number of people.

If, referring to the figures in the above table, we can imagine for a moment £300,000,000 of income transferred from the top to the

bottom of the scale, we see that the employment of a considerable number of servants, agents, retainers, luxury providers, and hangers-on of all sorts would be killed, while the spending of the £300,000,000 at the bottom of the scale would result in a greatly increased call upon the trades of necessity—the trades supplying boots, hats, clothes, furniture, and so forth. The net result would undoubtedly be a considerable addition to the material output of the nation, which we examined in Chapter IV.

We may express this in another way by saying that a portion of the National Income would be differently expressed. The National Income would not be increased, but, because of a better distribution, more of it would be expressed in material production and less in luxurious services. This very important logical nexus between the character of distribution of the National Income and the character of national production is only too often overlooked, or even completely misunderstood. For example, in his recently published *Elementary Manual of Statistics*, Professor A. L. Bowley, the well-known statistician, writes :—

'It is doubtful whether a perfectly definite meaning can be attached to Total National Income. The sum of money nominally representing it, of course, does not actually exist; a great part of income is actually received in the form of cheques, which are exchanged for services, and the total is more correctly a total estimated value of services rendered to, or commodities consumed by, the members of the nation, together with the addition for savings, that is to capital goods. In such a total are included the services of an agricultural labourer at £3 per month, and of a physician at the same price for a short visit, the value of a day's sojourn at an hotel, an equal value of sixty quartern loaves of bread or eighty ounces of tobacco. It is doubtful whether the same unit, £1 sterling, can, in any real sense, be used to measure such diverse and non-interchangeable services and commodities.'

When we find a thoughtful and accomplished writer thus betrayed into confusion of thought, it is doubly necessary to take nothing for granted in connection with the point under consideration. Mr Bowley, contemplating the diverse character of the components of the

National Dividend, goes the length of denying the function of money as a standard of value, and 'is doubtful whether the same unit, £1 sterling, can, in any real sense, be used to measure such diverse and non-interchangeable services and commodities.' But every hour we use the £1 sterling to measure and to exchange diverse commodities; it was invented for the purposes of such measurement and exchange.

It is true that the National Dividend is not homogeneous, but neither is the income of a workman nor that of a millionaire. We all of us receive our incomes in diverse commodities, but all those commodities are interchangeable, and we can elect to transmute our incomes into varying material or immaterial forms, as wisdom or folly directs. So it is also with the aggregation of incomes, large and small, which make up what we call the National Dividend. It is ultimately expressed in a diversity of goods and services which are called into existence by expenditure upon varying needs and fancies. The needs or fancies, especially the latter, may change without disturbing the aggregate income expressed in pounds sterling, because of the

perfect interchangeability of the components through the use of money.

Mr Bowley's own illustrations may be used to prove in what a real sense services and commodities are interchangeable. If the rent of an agricultural labourer's allotment is raised £2 by his landlord, the income of the labourer falls by that amount, while the income of the landlord is *pro tanto* increased. The National Dividend remains the same. The National Dividend is, however, changed in actual expression to the extent of £2. Having £2 less, the agricultural labourer buys so much less of bread or tobacco or what not. With the £2 obtained as increased rental, the landlord may pay a physician a fee, or obtain a day's sojourn in a hotel. In effect, there has been a transmutation of £2 of the National Income. Thus, 'the same unit, £1 sterling,' measures the most diverse commodities, and we see that the expression of the National Income in pounds sterling is no fanciful operation, but an entity of real use and value, and a thing the distribution of which is a most proper subject for anxious inquiry.

It may be well to illustrate the point further. In the year 1908 Parliament passed

into law an Act conferring Old Age Pensions upon men and women, aged seventy years and upwards, in necessitous circumstances. In 1913 these pensions were estimated to cost about £12,000,000. These pensions are paid for by increasing various direct taxes in such manner as to draw the greater part of the money required from the well-to-do and rich. Let us, to simplify the argument, assume that the entire £12,000,000 is taken from the rich and given to the aged poor: this is very nearly the truth. What is done is to transfer so much spending power from one class to another class. The National Dividend is not altered in the aggregate, and is as perfectly expressed in pounds sterling after the change as before the change. Nevertheless, the £12,000,000 stands, after the transfer, for an almost completely different set of commodities and services than was the case while the spending remained in the hands of the rich. Taken from expenditure on superfluities and given to expenditure on necessities the expression of a part of the national dividend in goods and services has changed, while its expression in money has remained the same.

It is sometimes argued that if the National Dividend were better distributed part of it would disappear, since it consists of the valuation of services rendered to the well-to-do. This is another form of the fallacy which was entertained by Mr Bowley when he wrote the above-quoted passage.

It is perfectly true that the expenditure of a rich man employs various persons, who draw large and small incomes because of that expenditure. A rich man, for example, may be a *malade imaginaire*, and pay high fees to a physician for doing nothing. If, however, the rich man had not drawn income in fractions from a number of poorer men, those poorer men would have had a larger purchasing power corresponding to the purchasing power wasted by the rich man. Equally, they might have wasted the fractions of income in drink or other folly, but the strong probability is that they would not have wasted so much of it, but, on the contrary, have made a call upon trades of necessity for material goods.

Another fallacy may, in this connection, be usefully dealt with. It may best be stated and disposed of in connection with a concrete

illustration. A has an income of £10,000. He employs a secretary, B, paying him £300 a year. It is sometimes said that in the National Income only the £10,000 should be counted, as part of it is passed on from A to B. According to this fallacious interpretation, A and B together have a joint income of £10,000. The true interpretation of the facts as stated is that the joint income of A and B is £10,300, and that that is the figure which should be counted in the National Income as expressing their incomes.

The reason for this will be plain on a moment's consideration. Why does A pay B £300? He pays it to obtain B's secretarial services, and the £300 worth of services enjoyed by A is part of A's income. B, the secretary, in his turn, has an income of £300, in exchange for which he can purchase £300 worth of commodities or services from other people. It is therefore a separate £300, and properly to be counted as such. The fallacy of considering it part of the £10,000 arises from a confusion of money as a measurer with the things measured. It would be the same kind of fallacy if we took a foot rule to measure two objects and declared that the

two objects were only one because we had measured them with one measurer.

The subject-matter of this chapter, it will be realised, is of very great importance. We have seen that the National Income is very unequally distributed, and that the nature of its distribution largely governs the form of material or immaterial expression taken on by the National Income through expenditure. If there is a fairly equal distribution, there will be a great call for necessities. If a large part of the National Income goes into the hands of a few persons, there will be an unsatisfactory call for necessities, and the embodiment or expression of a considerable part of the whole in luxuries or in the performance of often useless services. And the nature of the work done by the members of the nation means much both to the individual and to society.

CHAPTER VII

THE NATIONAL CAPITAL

British material wealth is the result of intelligent work exercised with the assistance of the intelligently stored labour which we call Capital. Not the Capital, but the ideas embodied in it, are reproductive, but to this point we shall return.

Nature furnishes man with a store of material in the shape of the roughly-hewn world which we live in—a world moulded by natural forces in such fashion that until man penetrated the secrets of Nature he necessarily remained in a condition of extreme poverty. The picture so often presented by loose thinkers, of a world flowing in milk and honey—a world of abundance, furnishing plenty for all men—is a grotesque misrepresentation of the facts of the case. The true position is that the labour of primitive man, applied to land as given by Nature to Man, furnished a beggarly subsistence.

Indeed, we have not to go back far in the history of mankind to find evidence of this truth. At this day, in 1914, there exist in some of the richest tracts of the world men living lives of abject poverty. In parts of South America, where Nature exhibits most of her alleged 'bounty,' a traveller may still find fearful men, almost propertyless, and unable to make increase because of lack of the means of subsistence.

Such is the case of Man as long as he remains a mere land animal, working with a few poor inefficient tools upon the land as Nature supplied it. Even the higher races of man, during thousands of years of development, learned so little in Nature's book of secrecy that at a period no further removed from the present than five generations, the mass of the people in every country of the world, without exception, were miserably and *necessarily* poor. It is only recently in the world's history—as it were but the other day—that the mass of white men began to emerge from poverty.

The emergence of the United Kingdom was broadly traced in the first chapter of this book. We saw how men learned to wring from

Nature the secret of the control of Power. At the beginning of the twentieth century we have not yet mastered the matter, but we have got far enough to enable us to control and to use motion in many marvellous and most helpful ways. This enables us to multiply by a thousandfold or by ten-thousandfold the physical energies of man. We can move great masses of matter with ease and celerity. We form the metals into ingenious machines, which enable us to mould all sorts of materials into useful forms. We are thus able to compel Nature to store matter for us in useful ways.

The result of this storing we call Capital, and it is the possession of capital, the material embodiment of intelligent work, which makes it possible for mankind to emerge from poverty. Without capital, Man can only be a humble land animal, wrestling laboriously with Nature to get food and a few materials from the earth, and having little time to spare to do more than that, so that he cannot be well dressed or well housed or enjoy comfort or culture.

With inventions embodied in capital, Man becomes the master of Nature, the master

of Nature's land. There is as much iron in the world to-day, in 1914, no less and no more, than there was in the year 1750, when an Englishman first learned to smelt iron ore with coal. In 1914, however, as we saw earlier in these pages, the world is making available for use over 70,000,000 tons of extracted iron, as compared with the mere 100,000 tons in 1750. In 1750 the iron was locked up; in 1914 Man is turning Nature's iron against Nature and compelling her by means of it to yield him food and materials and comforts which represent not the bounty of Nature, but Man's triumph over Nature.

The capital stock of a nation at any given moment consists of its land, and all the improvements made to the land and all the buildings erected upon it, together with all the movable or immovable machinery, furniture, and accumulated stock of commodities of every sort. Land, as given by Nature, is discernible in the United Kingdom only in certain mountain-tops and wastes. For the greater part, land has been worked up into a manufactured article. The natural surface, with all its impenetrable tangles and marshes, has been cleared and drained and worked

through long centuries of labour into its existing form.

The accumulated capital stock of the country is great as compared with what existed in that recent day to which we have referred, when Britain played a very humble part in producing the world's tiny stock of iron, but it is still exceedingly small in relation to the needs of our great population. The accumulated capital of the United Kingdom, including the market value of the land, in 1914, is not precisely known, but it is probably not less than £12,000,000,000.

We mean by this that the market value of all the properties is £12,000,000,000. The total includes the market value of more than material things. It includes, for example, such things as the goodwill of business firms. It includes, also, much capitalisation of profits, as in the case of railway companies and many joint-stock companies—*property, that is, in the right to draw interest, and not actual tangible capital.*

For example, if we capitalise railways by capitalising their profits at so many years' purchase, we arrive at what is considered in

commercial terms a fair valuation of what the business is worth to capitalists in the given circumstances. The profits, however, exist by virtue of legal monopolies conferred by the State, and what is commercially valued, therefore, is in large part not tangible capital, not material commodities, but the *power to draw monopoly profits*.

In Prussia, where the railways belong to the State, the railways stand in the books of the Government for no more than £353,000,000, the original cost being £547,000,000, and £194,000,000 having been paid off out of profits. The nominal capital of the railways of the United Kingdom, on the other hand, which are just about the same length as those of Prussia, stands at the absurdly high figure of £1,335,000,000. We see, therefore, that in including the nominal value of United Kingdom railways in the national valuation of capital stock, we are including a vast sum which stands for nothing in the shape of intrinsic value.

Another illustration may be drawn from the concrete case of a certain limited liability company, which for many years pursued the policy of issuing bonus shares to its share-

holders, those shares representing not any real addition to the tangible assets of the company, but a mere watering of the capital. Although the capital is thus watered, the business is so profitable that it still yields a high rate of profit to the shareholders, and therefore the bonus shares are bought and sold to-day at a high figure as representing the power to draw profit. They are therefore commercially valuable, but they represent no addition to the real capital of the country.

We may give a further illustration of the difficulty of presenting a true account of the national capital by reference to one of the largest items that figure in the national valuation, viz., the value of houses, business premises, etc. In the £12,000,000,000 mentioned, buildings, together with the lands on which they are built, stand for the very large sum of over £3,000,000,000. That is their market valuation, considered commercially as instruments by which income can be derived from persons who desire to rent houses or premises to live in or work in.

If a house will let for 10s. a week or £26 a year, it will sell for a considerable sum, no

matter how unhealthy or how dangerous to life it may be. The house may be not an addition to the national wealth, but an actual subtraction from it; nevertheless it appears in our commercial valuation.

In 1914 there actually exist in a large manufacturing town in the North two-roomed hovels, each room of which is let with a little furniture for 5s. a week to a family pigging in palpably indecent conditions. Our £12,000,000,000 contains a valuation at so many years' purchase of these dreadful places. They form an extreme instance, but unfortunately every town in the country contains a large number of houses which, although they have a market or commerical value, are only fit for demolition. London alone contains tens of miles of such houses—houses which are soaked in dirt and disease, and which no possible process of repair can render healthy human dwellings.

As to business premises also, it is unfortunately only a small minority which are of modern type. I should like to forget the existence of many of the workplaces which it has been my misfortune to inspect during the last ten years.

However, if we put aside the unfortunate consideration that the £12,000,000,000 includes the commercial valuation of so much that is unworthy and intrinsically valueless, or even maleficent or harmful, we see that the capital saving so far effected is small relatively to our needs. If our 9,000,000 families were housed, as they should surely by this time be housed, at a capital cost averaging no more than £500 per family, the valuation of private houses alone would amount to £4,500,000,000. This is but another way of saying that our present housing provision is mournfully inadequate, with the result that we have rife amongst us diseases which slay hundreds of thousands and incapacitate millions in some degree, with a cost to the nation which is only fractionally measured by our enormous expenditure upon medical and sickness benefits.

It is a thing most significant that while a reasonable estimate on commercial lines of the capital stock of the United Kingdom, including its lands, is about £12,000,000,000, British investors own about £4,000,000,000 worth of property in places outside the United

Kingdom. In *Riches and Poverty* (1910), I estimated British oversea investments at £2,637,000,000, this figure being arrived at by capitalising the interest received in this country. Sir George Paish, from a careful examination of foreign and colonial securities, comes to the conclusion that in 1913 such investments amounted to :—

BRITISH OVERSEA INVESTMENTS IN 1913

	£
Invested within the British Empire ..	1,780,000,000
Invested in foreign countries ..	1,935,000,000
Total	£3,715,000,000

According to this statement, British investors have no less than £3,715,000,000 invested in foreign countries and British possessions, this record taking account only of public undertakings. Other investments, of which it is impossible to obtain record, must exist, so that the statement is hardly likely to be an exaggeration of the facts of the case. The probable aggregate is not less than £4,000,000,000. The investing is divided almost equally between the British Empire and foreign countries, the investments in the British Empire amounting to

£1,780,000,000, and those in foreign countries to £1,935,000,000.

The broad features of the record are of much interest. Every part of the world has been fed with British capital, but it is in 'new' lands that the bulk of the investing has been done. European countries account for only £238,000,000, or about 6 per cent. of the whole. The United States has had £755,000,000, and the Latin Americas £724,000,000.

It is next of interest to compare this with British capital invested at home. As I have already said, a reasonable valuation of British private and public capital, apart from oversea investments and including the value of property publicly owned, at the end of 1913, is £12,000,000,000. Comparing this figure with oversea investments, we get the following remarkable contrast :—

WHERE BRITISH CAPITAL IS INVESTED

At Home	..	£12,000,000,000	..	75 per cent.
Abroad ..	..	4,000,000,000	..	25 ,,
Total	..	£16,000,000,000	..	100 ,,

We have the curious fact that British

investments within the United Kingdom are to British investments without the United Kingdom as three to one. Investment is made, of course, by those seeking interest, and it is unfortunately true that because 'new' countries, such as Canada or Australia, Argentina or Brazil, offer a much higher rate of interest than can be obtained in the United Kingdom, oversea investments have become popular with British investors, especially in these later years when there is increasing confidence in the financial stability of new countries.

It is not suggested here that oversea investments do not bring advantage to the United Kingdom. In the first place, they obviously bring profit to the well-to-do people who make them, and the people who receive that interest by their expenditure employ British workmen in various trades. That, however, is not the most happy of considerations, for such expenditure chiefly creates employment of kinds which by no means make for national stability or social welfare. More important is the consideration that investments in new and developing countries add to the wealth

of the world, and make available stores of food and raw material which are of considerable value to a nation like this, which, as we have seen, is largely dependent upon imports.

It will help us to understand how oversea investments affect the material circumstances of the United Kingdom if we consider a concrete case. Let us suppose that M, a rich man, invests £2000 in a new Argentine railway. The £2000 leaves this country, not in the form of cash, but in the form of goods, exported either directly to Argentina or to some other country which in its turn exports to Argentina, the facilities of international banking making this possible. (If M, the rich man, had £2000 worth of interest due to him from places abroad, then his investment of £2000 would simply take the form of transferring that interest from the place of its origin to Argentina, and no exportation of British goods to satisfy the £2000 would in that case take place.)

The investment being made, and assuming the new Argentine railway to earn profits, the interest would thereafter be periodically payable by the railway company in Argentina

to M, the investor. That interest would pass from Argentina to England, probably in the shape of Argentine wheat or Argentine meat. M, the investor, would not actually receive the wheat or meat himself, as the facilities of banking would enable him to draw his interest in any shape he pleased.

For example, he might, with £100 of interest received annually upon his £2000 investment, buy the work of a chauffeur, and in that case his investment would lead to the telling off of a British male worker to be a chauffeur. This is by no means an imaginary case, for undoubtedly many of the chauffeurs of the United Kingdom are sustained by the results of oversea investments.

If the most advanced nations had not devoted part of their capital to the development of the New World, they themselves would have suffered for lack of materials. While that is true, however, the process of exporting capital is one which needs careful weighing and safeguarding. Those who make oversea investments—the well-to-do minority—have in their minds no particular conception either of developing the world for its own sake, or of developing new countries

in the interests of the Old Country. One motive, and one motive alone, inspires them, and that is to get a higher rate of profit than they can obtain from a home investment.

The exportation of capital can easily be taken too far, and the fact may be illustrated in the concrete. We have shown in Chapter V. how slowly the rebuilding of England proceeds. In town and country alike the housing conditions of a considerable proportion of our people can only be described as disgraceful. Why does not British capital respond to this crying need instead of sending abroad to set up a tramway at Winnipeg, or water-works in Argentina? The answer to this question we have already given. A higher rate of interest can be obtained in Argentina than by the construction of decent and comfortable homes for the British working classes.

Therefore the first of our national interests is neglected, and the Government finds itself compelled, in 1914, to propose the building of rural cottages by the State. The Government finds itself driven to employ capital nationally, because private capitalists use

it anti-nationally, fostering foreign countries and British colonies rather than Britain. In a remarkable passage in a speech delivered on September 22, 1909, Mr Balfour rated the patriotism of capital in the following words:—

'You have capital, mobile capital, international capital, ready to move to America, to Germany, to England, wherever it may be that it can get the best investment. There is not that inequality of opportunity between those countries which was the whole basis of the original economic doctrine of Free Trade. Now, what I want you to notice is this. The condition of things which I have just explained matters very little to the capitalist. If he gets his interest, it matters little to him whether he gets it by giving employment in America, giving employment in Britain, or giving employment in Germany. To him it is all one. It is not one to the workers of this country.'

The probability of the future is that nations will find themselves driven increasingly to employ capital nationally as private capital grows increasingly cosmopolitan. It is exceedingly difficult to induce private capitalists

to develop any but resources which yield immediate profit, and it follows, therefore, that they may easily neglect the chiefest interests of a nation. For example, private capitalism failed to complete the Manchester Ship Canal. It became necessary for Manchester herself to finance the completion of the undertaking, with results for Manchester which can only be described as magnificent.

Private capital miserably failed at Panama —failed so badly, in spite of the great skill of French engineers, that the word Panama became synonymous in France for peculation and dishonesty. Under private capitalism the name of the Isthmus became a scandal. When the American Government took up the undertaking the motive changed, and as I write, in 1914, the work is successfully drawing to a close. It is a triumph for the national use of capital as compared with its anti-national and anti-social use.

Another striking instance may be given. The United Kingdom, which long ago got rid of its timber in a vain attempt to sustain an iron industry, has a smaller timber area, in proportion to its size, than any other

country in Europe. Yet we have millions of acres suitable for afforestation. What have the private capitalists done, and what are they doing? Here is a magnificent and enormous new industry ready to our hands. Its development would not only increase the national wealth directly, but produce many indirect industrial, social, and climatic effects of a beneficent character. Private capital, however, will not stir a finger, because afforestation means the investment of capital which cannot yield any return at all for forty or fifty years.

A Royal Commission has advised the Government to act, to employ national capital, to repair private neglect, and doubtless this will be done in the near future. So far, the Government has hung back, for the national use of capital is more a novelty in this country than in any other, unfortunately for the nation. In the meantime, capital is going abroad every year to a degree which is a danger to Britain. There must be a larger employment of capital at home for both industrial and social purposes, and there is no point in the national economy which more closely deserves the attention of the nation.

Unfortunately, however, it has to be added that there is no point which is so completely overlooked by those charged with the governance of Britain, and the public looks on unmoved even while British capitalists send British capital abroad to construct in foreign lands vessels and munitions of war which may possibly be used against us. The money-lender is easily the master of us all, governors and governed.

CHAPTER VIII

THE FRUSTRATION OF CAPITAL SAVING

We have seen that the total capital of the United Kingdom, including all oversea investments owned by British citizens, is about £16,000,000,000. Subtracting £4,000,000,000 for oversea investments, we get the sum of £12,000,000,000 as the value of the United Kingdom capital alone. This includes the unimproved value of the land, and if we put this at £2,500,000,000, we have left £9,500,000,000 as the value of British capital apart from its land. This means, in 1914, about £200 per head of the population, which is obviously insufficient. In view of the progress of science it is not too much to say that at least as much as that ought to express one form of capital alone, viz., the housing of the people, for £200 per head is only £1000 per family, and £1000 builds a fairly comfortable small house.

Another way to view the figure is to imagine

the nation, as a whole, saving £300,000,000 a year. At that rate, it will be perceived that the whole existing capital stock of the nation, apart from oversea investments, could be saved in the short space of thirty-one years. If the United Kingdom had existed for one hundred years, and had saved £200,000,000 a year for home use, our capital stock, apart from unimproved land value, would be £20,000,000,000. Our existing capital savings are so small that it is clear that our people must have endeavoured to save more than they have actually done. Can we throw any light on what they have attempted to save?

One very instructive piece of information exists. The record of the companies registered under the Companies Act, passed in 1862, just fifty-two years ago, covers a large part of the adventures of capital since that date. In recent years, indeed, it covers probably the greater part of individual attempts to save. Not only ordinary trading undertakings, but banks, most privately owned tramways and water-works (but not railways) are here included. What does this valuable record show?

In the years 1862 to 1911 as many as 131,305 companies were registered, with a nominal capital of £7,500,000,000.

How many of these companies and how much of this capital remained in being in 1912, the last year for which we have record?

The Joint Stock Registrar assures us that 'the companies believed to be carrying on business' in April, 1912, numbered only 56,400, with a capital of just over £2,300,000,000.

Thus, during the fifty years, some 75,000 companies and £5,200,000,000 of real or nominal capital were wiped off the Registrar's books. About two-thirds of the total capital registered disappeared.

Here are the precise figures :—

HOW JOINT STOCK CAPITAL MELTS

	Number	Nominal Capital
		£
Joint Stock Companies Registered during 1862–1911	131,305	7,500,000,000
Joint Stock Companies (believed to be carrying on business) in April, 1912	56,352	2,300,000,000
Companies and Capitals which have disappeared in 50 years	74,953	£5,200,000,000

It should not be forgotten that the mere registration of £7,500,000,000 of capital in fifty years does not necessarily mean the formation of so much new *real* capital in the period. Registration as a joint stock concern is often merely a registration of existing capital, not a new saving. But whatever the cause of registration, be it registration of old genuine capital, registration of new genuine capital, registration of promoters' profits masquerading as capital, or what not, the reduction of £7,500,000,000 to £2,300,000,000 during fifty years is most significant. We cannot tell what part of the £7,500,000,000 was the expression of real saving and not the mere creation of paper, but when every allowance is made for nominal registration, the disappearance of over two-thirds of the sum registered must stand for an enormous wastage.

We have no clue whatever to the wastage of capital by individuals or firms. Since 1862, private firms have rapidly decreased as the limited liability principle has extended its operations. In 1911–12, public companies declared for income-tax purposes, profits of £306,000,000 against £195,000,000 declared

by private persons and firms, showing that limited liability now rules the greater part of our trade and industries. It is probable that in the fifty years referred to, the losses of private firms have not been so great as the losses of companies, but it is improbable that the savings wasted by private undertakers, large and small, could be expressed in less than thousands of millions sterling. Between joint-stock companies and private firms, wholesale and retail, it is quite probable, therefore, *that at least* £6,000,000,000 *of real attempts to save have been frustrated in a single generation.* It is clear that our existing capital stock ought to be much greater than it is in view of the saving attempted.

Behind these cold figures lie hundreds of thousands of shames and tragedies. They speak of robbery, legal and illegal, of trusts betrayed, of the many varieties of chicanery which too often attach to commercial operations in spite of the repeated attempts of Parliament to protect the public.

The man who has something to sell is rarely ingenuous. The enterprise which leads a restaurant keeper to sell for 2s. a bottle of

cheap claret which cost him 8d., is precisely the same quality as that which leads a company promoter to buy up (*e.g.*), a number of small brewery firms for £40,000, and to offer them to the public as the Excelsior Brewery Company, Limited, with a capital of £120,000, and, again, precisely the same quality which leads the Reverend Septimus Brown, M.A., to apply for £100 worth of ordinary shares in the Excelsior Brewery Company, Limited, in the confident hope that, like the widow's cruse, his £100 of brewery shares will never fail, but bring him in a comfortable £10 or £15 a year, while he is occupied in the cure of souls.

When, chiefly owing to the £80,000 pocketed by the company promoter, the Excelsior Brewery Company, Limited, fails after three years of struggle, and the Reverend Septimus Brown denounces the man who pocketed nearly all his £100 as a swindler, he denounces a man actuated by precisely the same motives as himself.

A company promoter's profit is often not a whit more dishonest than an ordinary trader's profit, but because it is taken on a large scale the State has again and again

felt itself compelled to interfere and to impose restrictions upon methods which are not imposed on the retail trader. The simple and honest process of buying for a penny and selling for twopence, practised upon the poor every day, looks horribly dishonest when elevated to the million pound scale and practised upon the well-to-do.

We have now to consider the social wastage of savings which arises from the transfer of capital to new owners at a premium. The premium on the stock is capitalised usury, not a real addition to national capital. Let us consider a concrete instance. A syndicate sets up a number of teashops. It puts up, say, the £10,000 worth of capital, and with it buys or rents premises and stocks them, and hires cheap labour to sell food dearly. The profits being very great, the £1 shares rise to £5 each on the market. The original adventurers clear out, and leave a new set of proprietors in possession who have paid five times as much as they did, or £50,000, for the teashop plant.

What has happened? Not a chair, or cup, or table has been added to the real capital employed, but £40,000 of fresh savings now

figure falsely as 'capital.' £40,000 of capital has been, from a social point of view, wasted, and no real social saving, no fresh storing up of labour in a durable form, has taken place.

The transfer of stocks and businesses at a premium socially wastes a sum every year which cannot be estimated, but which must be very great.

So far we have dealt only with the lack of capital arising from the waste of such moneys as people have actually endeavoured to store up. But if we add the £6,000,000,000 or so which I have named as a not improbable estimate of such waste to the actual existing wealth of the United Kingdom, we still have a figure totally inadequate when considered in relation to the real needs of the British people.

The waste of a large proportion of such sums as individuals attempt to save, great as it is, is trifling when compared with the daily and hourly misdirection and waste of labour which ought to be wisely used and stored. It is probable that since 1860, in addition to the thousands of millions of capital actually wasted, an even greater sum which ought to have been saved has been

squandered in useless or even degrading expenditure.

It should not be forgotten, however, that one particular cause of wastage of capital needs to be increased. Too small an amount of stored labour is now devoted to experiment. The larger part of such adventures as are made are simply competitive adventures, whose aim is gain, not fruitful experiment. In advertising rival brands of food alone an enormous amount of capital is poured away every week. Town and country are littered with iron, wood, canvas, and paper, in the endeavour to establish a 'name' in articles which are natural products, and to attach a producer's name to which, by costly methods, is obviously a ridiculous waste of labour.

While such follies as these offend our eyes at every street corner, a thousand needful experiments remain untried and a thousand common conveniences remain neglected. We need the application of stored labour in continuous and costly experiments in every branch of industry. Such proper dissipation of capital does now appear, but in a degree as inadequate as the dissipation of capital in mere competition is too great. When profit

is the only immediate object, it is left to a few wise rich men and to a few poorly endowed institutions to sustain, by capital stores, the experimenting of a great nation. In physics as in industry, in medicine as in agriculture, our progress is starved by lack of application of capital.

The greatest tasks to which Man can set his hand, the conquest of disease, the restoration of the proper physical standard of the race, the beautification of cities—these offer no profits to the man with savings, these are things which, therefore, lack endowment. The labour of a few days per man per year, stored for use in wise experiment, might regenerate the race in a few generations. The principles which now direct national to the capital manufacture of a *Dreadnought* need to be freely applied to the housing, warming, clothing, feeding, and training of the people.

Undoubtedly the limited liability principle sometimes leads to the promotion of useful experimental schemes which not even a very rich man would care to attempt alone. Money has been quite legitimately lost by syndicates in the attempt to establish new

methods of industry which call for practical tests. The charge against private capital in this connection is that it has been too timid, not that it has been too enterprising, but it remains true that the limited liability principle has undoubtedly encouraged experiments by pooling risks. It remains to inquire whether the principle of pooling risks cannot be carried further. It should be possible for the nation deliberately to devote a large amount of stored labour every year to far-reaching experiments in every branch of activity.

CHAPTER IX

THE FRUSTRATION OF WEALTH PRODUCTION

THE frustration of capital saving necessarily means the frustration of production.

The ideas and discoveries of all the inventors and scientists that have ever lived in any country up to this hour, as I write in the year 1914, form a great body of lore which is theoretically at our disposal, save in so far as unexpired patents exist. The British Patent Law, however, puts a very short term to the patentee's monopoly. The important parts of the Patents Act of 1907 run thus :—

> Section 17.—(1) The term limited in every patent for the duration thereof shall, save as otherwise expressly provided by this Act, be fourteen years from this date.
>
> Section 18.—(5) If it appears to the Court that the patentee has been inadequately remunerated by his patent, the Court may, by order, extend the term of the

patent for a further term not exceeding seven, or, in exceptional cases, fourteen years.

No matter how clever an invention may be, no matter how much wealth it may enable other men to make, no matter if it even increases the wealth of the country by thousands of millions of pounds, as the work of George Stephenson did, we put a short term to the inventor's monopoly. From fourteen to twenty-eight years is the narrow limit we set upon it. A patent of invention cannot be handed down from father to son, and it may happen, and often does happen, that an inventor gains little or nothing, owing to lack of recognition of the value of his work until his patent has expired or nearly expired.

By far the greater number of patents covering the world's inventions have expired under British law, and theoretically they are freely at the disposal of the British people for the purposes of wealth production. As to unexpired patents, another fourteen years will witness the liberation of nearly the whole of them.

That is our theoretical relation to the work of science and invention. Our position for

practical purposes, however, is very different. The great majority of the wealth-producing inventions which are nominally ours cannot be economically exercised in practice unless they are embodied in a certain industrial plant. We can say this in other and illuminating words, thus :—

The ideas of the inventors, to which alone we owe advance in the arts of wealth production, need to be physically embodied in Capital, and those therefore who command Capital command the ideas of the inventors and the production of wealth.

We mock the mass of the people of the United Kingdom if we inform them blandly that in theory they are the inheritors of all the magnificent wealth-producing conceptions that have ever entered the minds of the greatest and most brilliant men that the whole world has produced. Since wealth-producing ideas cannot, save in exceptional cases, be exercised without Capital, the capitalist is the master of the situation. The monopoly in ideas, which the Patent Law seeks to prevent even at the cost of robbing the clever man of the fruit of his own genius in his own lifetime, is not in effect prevented.

Monopoly is denied to the clever inventor; it is usurped by those who wield Capital.

And let us not fail to observe that, with the assistance of many writers, a false doctrine, viz. that Capital is an agent in wealth production, has been erected and accepted, even while the inventors have been periodically robbed of their wealth-making ideas. The thing would be humorous if the consequences were not so grave. Let us consider the matter as it is, stripped of the customary formularies of false conception. Let us take a railway plant, for example.

What is it that is actually reproductive in the railway apparatus, whether it take the form of a prepared road, or steel rails properly laid, or locomotives, or railway carriages or wagons, or signalling plant, or what not? These and the other things constituting the railway as a going concern are formed of materials having a certain gravity and measurement. The materials are not only not reproductive, but for the most part they decay as soon as they are produced and shaped. The pieces of steel we call rails have no power to reproduce their kind or any other kind. The steam locomotive, even in

1914 not a very great advance upon what George Stephenson left it, is a complicated piece of mechanism which will more easily deteriorate than a steel rail. The delicate signalling apparatus would become useless if resigned to Nature for a very brief period. It is clearly not the materials of the railway plant that are reproductive.

Is it, then, the labour employed upon the materials, either in fashioning them or in maintaining them? Most assuredly not, for the same amount of labour, or ten times as much labour, exercised otherwise than in accordance with the ideas of the inventors, would not give us a railway.

What, then, is reproductive in the railway plant is clearly the ideas of the inventors, and these alone. The material, as fashioned, and the labour as exercised in maintenance and in running, are merely expressions of, or servants of, wealth-producing ideas.

The common conception, the accepted doctrine, is that those who use Capital should pay toll for its use. If there is any virtue at all in the underlying conception of the Patent Law, however, it is that inventions fall in, not to capitalists, but to the nation,

and that therefore Capital ought to pay to the nation toll for its employment of the national stock of ideas. It will be perceived that these considerations carry us far in respect of the principle of interest payments —payments which have become so customary that all our social conceptions and legislative enactments are founded upon the assumption, to quote the words of Henry George, the single-tax prophet, that 'interest is natural and just.'

Let us relate these important considerations to what we have established as to the present use of ideas as employed in Capital.

Dependent as we are upon the proper use of ideas to get wealth, we see that a lamentably inadequate capital stock has been set up. The frustration of capital saving, which we examined in the last chapter, read together with the extraordinary monopolisation by a few of the little capital there is, means, and can only mean, poverty of production allied to a grossly inequitable distribution of what production there is. Given knowledge of the true nature of the poor amount of capital stock which exists, and of its unequal distribution, we could, without knowledge of

the existing disorders of society, deduce a condition of poverty for the majority.

Let us face the facts. If we want wealth in adequate supply, we must freely use the inventors' ideas. As a nation, we make no attempt to use ideas socially, save in respect of limited national and municipal services. When we do that we do indeed get a remarkable fruition. Let us consider a few examples.

In the British Navy, in the British Post Office, in the common town sewerage and lighting systems, we do get freely available for all an ample supply in relation to their purpose of the fruit of certain inventions. *In relation to these no man is poor.* In relation to these we have unconsciously rid ourselves—or, to be quite accurate, almost entirely rid ourselves—of the private exploitation for private gain of ideas that belong to the community.

But as to the bulk of fruitful ideas, we are content to rely upon what enterprise may chance to enter the minds of men in pursuit of profit. If ideas relating to the glass trade, or to the chemical industry, or to house-building, are neglected or abused by the private individuals who are, or ought to be,

exploiting the ideas, we are content. If the average warship were as inefficient as the average house the nation would be in a ferment; but our houses being what they are, we are so possessed with *laissez-faire* that we are well satisfied.

On every hand we see the inventors' ideas either neglected or abused. If we walk in poor, or middling poor, neighbourhoods, we see that every shop is laden with rubbish, foisted upon the public in pursuit of gain by industrial routineers, who not only lack ideas themselves, but put to shame the beautiful machines and processes with which they have been provided by clever men, most of whom are dead. In every town in the country, London included, it is only the minority of our shops which exhibit goods which can be termed worthy embodiments of the brains of the scientists or of the designs of the artists.

And even with all the mass of rubbish included, valued at the often inflated and artificial prices created by combinations between manufacturers, we have seen in a previous chapter (Chapter IV.) how small is the valuation of their output by the manufacturers themselves.

The greatest degree of efficiency is incompatible with the given conditions. Our manufacturers have, as things are, to be traders before they are manufacturers. It is not possible for the industrial captain to do what ought to be done, even if he desires to do it. His is not to make the best possible commodities in satisfaction of a given and known supply. His it is to make routine practice of wonderful inventions in a competitive market, or, if he has combined with other manufacturers, in private monopoly, which may be even more antagonistic to the interests of the community than fierce competition. In selling he is dependent upon a clumsy distributive system, which is as to a small part in the hands of his own agents, but which as to a large part is entirely out of his control. He and his fellows advertise extensively, employ travellers, pay commissions, and take the only too great risks of bad debts.

A large gross retail profit has to be loaded on to the factory prices dealt with in Chapter IV. to maintain the retail traders, and the retail traders in their turn, owing to the enormous number of shops in relation to

population, and the fact that landlords and moneylenders annex a large share of their gross takings, have often to struggle bitterly for existence to earn a small net retail profit. And always between the factory and the shops, as between the factory and the ports, there stands the great private railway monopolies which Parliament has erected, drawing nearly £50,000,000 per annum out of freights and passengers, and frustrating the great inventors who taught us how to move goods and people with rapidity and cheapness.

What between the wasteful distributive agents controlled by the manufacturer, and the wasteful distributive agents outside the manufacturer's control, millions of able-bodied persons are employed, not in producing goods, but in wastefully distributing them through lack of commonsense organisation. The millions of distributors do not live upon distribution; they live by reason of receiving material things, food, clothes, and so forth. In short, they are paid out of the total produce, and as their contribution to production is wasteful, they dilute the stream of wealth instead of adding to it.

It is a picture of lack of organisation—of

unnecessary competitive capitalists, of unnecessary office staffs, of unnecessary travelling staffs, of unnecessary advertising, of unnecessary retail agents. How can one wonder that the stream of commodities is small when the clever inventions which we ought to be using by co-ordinated and co-operative effort are used clumsily and intermittently by a certain proportion of the population, while another proportion, enormously great, is not using them at all?

How is the nation to protect itself from the neglect or abuse of its great inheritance of ideas? How is it worthily and adequately to employ capital?

For myself, I see no prospect of adequate capitalisation short of the national organisation of the use of ideas and the national accumulation of capital. Sooner or later, it seems to me, the sheer necessity of making better use of capital will be forced upon the legislator. Already we have it freely acknowledged by every political party in the State that private enterprise has failed in the elementary duty of housing the British people. Equally it is acknowledged that British agriculture languishes for want of the capital

which has been so freely bestowed upon places afar off. Political programmes in 1914, from whatever source arising, are thick with suggestions that the nation as a nation, the community as a community, should help itself, because private persons in pursuit of private gain have failed to help it.

It is true that most of those who propose to step in to save the State make suggestions chiefly remarkable for their inadequacy. Little remedies are suggested for grave and gigantic evils. It is nevertheless good that the evils should be recognised. By-and-by the little things will be found to fail, but the motive to remedy will remain, and it will come to be recognised that the large affairs of a great nation are not to be disposed of, save by measures commensurate with their true dimensions. The national organisation of necessary services may be delayed, but the end is not now in doubt. Just as we have now an adequate Navy and adequate sewers, so we shall come to have adequate railways, adequate housing, adequate industries, and above all, an adequate power supply.

This brings us to the reconsideration of the material basis of British wealth. We should

deceive ourselves if we were to regard the nation as in a permanently static condition with regard to the factors of wealth, and all that we have yet considered has to be brought into its proper perspective in relation to the great underlying advantage from which the ideas of the modern inventor, however clumsily used, have derived what wealth we have.

CHAPTER X

WILL BRITISH WEALTH ENDURE?

I NOW return in detail to the consideration of the all-important question raised in the first chapter. That question is: How long will Britain retain that peculiar advantage in large scale production which her magnificent coal supply gives her? It is proper that that should be the first and last consideration raised by a work which deals with the nation's wealth.

We have seen that British wealth is based upon rich coal-mines, situate in a small island near the sea, and often adjacent to tide water. We have seen the mines as magnets attracting wealth from all the world. So extraordinary is the advantage which rich native coal confers, that it is not an exaggeration to say that a stupid and untrained people possessing such coal could more easily attain to wealth than a clever and well-trained

people denied coal by Nature. How long will Britain retain her advantage?

We may best approach the subject by reviewing what has already happened in respect of the world's coal development. For reasons already explained, Great Britain for long remained the chief coal-getter in the world, in spite of the fact that the United States of America and Germany possessed fine coal-fields. It was not until 1870 that Germany won national unity and the power to work her resources in peaceful development. Since that date the mighty German Army, making Germany in effect an island, has enabled the Germans to develop their fuel resources and industries based upon them.

By 1870, too, the United States was rapidly gaining the population necessary to exploit her wonderful natural wealth. In 1840, the population of the United States was 17,000,000; in 1850, it was 23,000,000; in 1860, it was 31,000,000; in 1870, it was nearly 39,000,000; and by 1880, it was over 50,000,000. After 1875, both the United States and Germany made rapid advance, the advance in each case being mainly due to the same cause which,

in earlier days, had given Britain rapid advance.

The progress of the world's coal production may be gathered at a glance from the important statement which appears on p. 169, which will repay the most careful attention, for it is easily the most important group of facts which can be studied in connection with the rise of modern wealth and the progress of modern nations. It shows the advance of the world's coal production for a period of over a generation. I have included the outputs of lignite, or brown coal.

In 1875, which, as I write in 1914, is less than forty years ago—a year which is but the other day in the world's history, and which is within the clear recollection of millions of people amongst us—Great Britain actually produced nearly one-half of all the coal produced in all the world. The United States and the German Empire, the two next most important coal producers, had an output between them of less than 100,000,000 tons, or much less than Britain produced.

Observe the changes wrought in the next ten years. In 1885, while the British output had risen to nearly 160,000,000 tons, that

of the United States had reached nearly 100,000,000 tons, having more than doubled in ten years. The German output had also greatly increased, and reached over 72,000,000 tons.

Thus, in 1885, the total output of the three great coal nations reached nearly 331,000,000 tons out of about 400,000,000 tons produced by all the world, but the share of Britain in the world's output had fallen in a decade from 48 per cent. to just under 40 per cent. Whereas in 1875 Britain produced more coal than America and Germany put together, in 1885 America and Germany together produced more coal than Britain.

The lapse of another decade saw further extensive changes. The British output again rose, but it was nearly equalled by that of America, while that of Germany had risen to over 100,000,000 tons. Again the three countries together produced the greater part of the world's output, but the British proportion of the total output had fallen to 33 per cent.

By 1906, it will be seen, we were completely outdistanced by the United States, which then produced 350,000,000 tons of coal

against our 236,000,000 tons. The German output had also greatly risen, and reached 171,000,000 tons. Britain was now producing about one-fourth of the world's output of coal instead of the one-half of only thirty years before.

The latest world figure I can give is that for 1911. Then, it will be seen, while the British output had risen to 272,000,000 tons, it was still further outdistanced by the 443,000,000 tons of the United States, while Germany had crept nearer with an output of 231,000,000 tons. The British proportion of the world's output had fallen to under 24 per cent., still a wonderful proportion, but not that old dominance which meant that Britain was first and the rest nowhere.

Throughout the period examined, the extraordinary pre-eminence of Britain, America, and Germany is the outstanding world factor. In 1911, it will be seen, these three countries actually produced nine out of every eleven tons produced in all the world. That is the reason that these three nations exercise such a remarkable industrial predominance.

In the period reviewed, the production, trade, and wealth of the United Kingdom

THE WORLD'S COAL POWER
(Lignite is included)

(The figures represent millions of Tons Avoirdupois)

Country	1875	1885	1895	1905	1911
United Kingdom	133·3	159·4	189·7	236·1	271·9
United States ..	46·7	99·1	172·4	350·8	443·0
German Empire	47·8	72·4	102·3	171·1	230·8
United Kingdom, United States, and Germany together ..	227·8	330·9	464·4	758·0	945·7
British Possessions	2·9	6·6	12·9	28·8	42·3
France	16·7	19·2	27·5	35·4	38·7
Belgium ..	14·8	17·2	20·1	21·5	22·7
Austria-Hungary	12·9	20·0	32·1	41·8	47·3
Russia	1·7	4·2	8·8	18·4	22·8
Italy	0·1	0·2	0·3	0·4	0·5
Spain	0·7	0·9	1·7	3·4	4·0
Sweden ..	0·1	0·2	0·2	0·3	0·3
Japan	—	1·3	4·8	11·8	15·8
The World ..	277·7	400·7	572·8	919·8	1,140·1
United Kingdom output expressed as percentage of World output	48·0	39·7	33·1	25·6	23·8

have greatly increased. Nevertheless, its production, trade, and wealth relatively to that of the world at large has decreased. This coal table—this industrial power table—explains at once the actual rise and the relative fall of Britain in the last forty years.

The other main coal-producing countries in the world are shown in the statement, and none of them, it will be seen, as much as ranks with the three leaders. Some of them have extensive coal resources, but none of them has coal so readily worked and therefore so economically effective as that of either Britain, America, or Germany. Thus, with coal the arbiter of industrial destiny, they are severely handicapped in competition.

One country does not appear in the table, although she has enormous supplies of good coal, and that is China. Marco Polo found the Chinese using coal in the thirteenth century, but the Orientals never discovered the secret of the industrial use of coal, a fact which need not perhaps surprise us since, in spite of the fact that the ebullience of steam came under the observation of millions of people during thousands of years, it was not

until quite recently in the history of the world that any man thought of using its power. It does not represent the matter properly to say that certain 'advanced races' of men discovered the use of steam, for in point of actual fact that discovery was made by a few men; the rest of us have no more cause for pride in the matter than any Chinaman that ever lived.

As far as the case has at present developed, it may be summed up thus: The economic use of coal gave Britain a special and tremendous advantage for a limited period, owing to the fact that other countries possessing coal—especially those great coal countries, Germany and America—were, for various reasons, not in a position to utilise their resources, while Britain, being an island and possessing internal peace based on the command of the sea (a fact to be commended to those who regard the British Navy as a factor of 'waste'), made rapid development. As soon as the other coal countries were in a position to use their coal, we lost our extraordinary predominance, and Britain is now one of three great industrial coal-based powers.

What of the future? Since British wealth depends upon coal, it is important to inquire (1) how much coal we have; and (2) will our coal last as long as that of our competitors?

Since Jevons directed the serious attention of the nation to what he truly called the 'almost religious importance' of the coal question, we have had two Royal Commissions on the subject of our coal supplies, and have been equally unfortunate in each. The Royal Commission of 1866 was set up in consequence of the work of Jevons, but its members showed themselves quite incapable of dealing with a great subject. As has been remarked by Mr D. A. Thomas, one of our great coal-owners, their report was an 'extraordinary production,' chiefly notable for a profound misunderstanding of Jevons's case, and for a particularly absurd forecast as to our coal exports, which they declared were not likely to advance much further.

The Report of this Commission started the absurd story that Jevons foretold the exhaustion of British coal within one hundred years. Jevons, of course, did nothing of the sort, as the reader can see for himself by purchasing Jevons's *The Coal Question*, a book which

ought to be in the possession of every intelligent British citizen. (An edition, brought up to date by Mr A. W. Flux, is published by Macmillan & Co., at 10s. 6d.) Reference to the frontispiece of that work will show that Jevons demonstrated that it was impossible for the rate of increase of coal production of his time to continue. The misrepresentation of Jevons has remained current until to-day, and only recently I had it repeated to me in conversation by a member of the House of Commons.

In 1901, a second Royal Commission on Coal Supplies was appointed, and it reported in 1905. It is hardly to be believed, but this Commission, like its predecessor, repeated the misrepresentation. Asked to report, *inter alia*, upon the probable duration of our coal resources, the Commissioners in their Report, published in 1905, contented themselves with printing the following (the italics are mine) :—

'This question turns chiefly upon the maintenance or the variation of the annual output. The calculations of the last Coal Commission as to the future exports, *and of Mr Jevons as to the future annual consumption,*

make us hesitate to prophesy how long our coal resources are likely to last. The present annual output is, in round numbers, 230,000,000 tons, and the calculated available resources in the proved coal-fields are, in round numbers, 100,000,000,000 tons, exclusive of the 40,000,000,000 tons in the unproved coal-fields, which we have thought best to regard only as probable or speculative. For the last thirty years the average increase in the output has been 2½ per cent. per annum, and that of the exports (including bunkers) 4½ per cent. per annum. It is the general opinion of the District Commissioners that, owing to physical considerations, it is highly improbable that the present rate of increase of the output of coal can long continue—indeed, they think that some districts have already attained their maximum output; but that, on the other hand, the developments in the newer coal-fields will possible increase the total output for some years.

'In view of this opinion and of the exhaustion of the shallower collieries, we look forward to a time, not far distant, when the rate of increase of output will be slower, to

be followed by a period of stationary output, and then a gradual decline.'

The Commissioners did not care themselves to venture an estimate, but they did venture to reflect upon Mr Jevons in a manner which showed that they had never read, or if they had read, had never understood, Jevons's monumental work.

Mr A. W. Flux writes in his preface to Jevons's *The Coal Question* :—

'In their reports (the reports of the two Royal Commissions referred to) Jevons is referred to as calculating that the coal consumption of the United Kingdom would reach certain very large amounts in the near future; and, a divergence being shown between actual experience and what is called his prophecy, his argument is discredited. Now Jevons himself took pains to point out that the figures set forth are merely a statement of how great the consumption of coal would become if the rate of progress shown at the time at which he wrote were maintained.

'It is an absolutely fundamental point in his argument that that rate could not long be maintained, and that the general prosperity

of the nation must be affected by the inevitable reduction of the rate of increase of coal consumption. Though hesitating to name the date at which the reduction would become marked, he stated clearly that, in his opinion, it could not be as much as a century distant. In view of this, the fact that a decreased rate of growth became manifest within twenty years, can hardly be regarded as a disproof of the validity of his arguments.'

It is highly doubtful whether the Royal Commissioners of 1901 understood, in publishing the paragraph I have quoted, that in so far as they ventured to express opinion, they were supporting the views of Jevons. I direct special attention to their concluding words, and repeat them :—

'In view of this opinion and of the exhaustion of the shallower collieries, we look forward to a time, not far distant, when the rate of increase of output will be slower, to be followed by a period of stationary output, and then a gradual decline.'

The meaning of these words should be most carefully pondered, and I will paraphrase them to make their meaning clearer.

'We may look forward to a time, not far distant, when, owing to the exhaustion, not of the total supplies of British coal, but of those supplies which are most easily mined, the rate of increase of British coal output will slacken and therefore the price of British power production will rise; consequently British coal consumption will become stationary, which will mean stationary industry, and this period of check will be followed by a reduced coal production, which will be indicative of declining power production and of declining industry.'

This paraphrase assumes, as it is convenient to assume at this stage of the argument, that coal is to remain useful, *i.e.* that it is not dethroned by the substitution, through scientific advance, of a superior source of power.

The meaning of the Royal Commissioners' words, in common with the meaning of Jevons's work, was widely ignored upon the publication of the Report in 1905. What was seized upon by the public was the estimate given by the Commissioners of the probable dimensions of British coal resources, which they thus stated :—

BRITISH COAL RESOURCES

Estimate of the Royal Commission on Coal Supplies (1905)

	Tons
In Proved Coal-fields :—	
Under 4000 ft. deep ..	100,900,000,000
Over 4000 ft. deep ..	5,200,000,000
In Unproved Coal-fields :—	
Under 4000 ft. deep ..	39,500,000,000
Total	145,600,000,000

These apparently handsome figures acted as a soporific. In the year when the jolly-looking figure of 100,900,000,000 tons of coal was given to the world as an estimate of the British coal existing in proved coal-fields less than 4000 feet deep, our coal production amounted to 222,000,000 tons. You had, therefore, but to divide 222 into 100,900 to get a period of over 450 years as the life of British coal in proved fields not too deep for successful working! In 1914, when the output is about 280,000,000 tons, we get a period of 320 years by dividing this into the 100,900,000,000 tons, reminding us how the question is affected by increase of consumption. In 1911, Sir William Ramsay, in his Presidential Address to the British Association, uttered the opinion that it was a

reasonable calculation that the 100,900,000,000 tons of coal would last 175 years, in view of the increase of output, and made the following comment :—

'Our commercial supremacy and our power of competing with other European nations are obviously governed, so far as we can see, by the relative price of coal; and when our prices rise, owing to the approaching exhaustion of our supplies, we may look forward to the near approach of famine and misery.'

And he went on to say that it was the urgent duty of the British legislature to conserve British coal. This led to a question being put in the House of Commons to the Home Secretary, and the official reply which was prepared for that great officer of State ran that—(1) we had 150,000,000,000 tons of coal, taking into account coal in proved fields at greater depths than 4000 feet, and coal in yet unproven fields, and that further we must not assume that the rate of British coal output in the future will go on increasing as rapidly as in the past.

This is the kind of treatment of a great subject which, when given by a Government

Department, may well make one despair. We see that the Home Office, unlike Sir William Ramsay, has apparently not grasped the important fact that what matters is not the absolute exhaustion of coal, but the exhaustion of that cheap or easily accessible coal which gives us, in common with only two other nations, a peculiar advantage in the world of work.

Moreover, the Home Office answer, in its last phrase, gave us an utterance, the significant character of which hardly seemed to be understood by those who framed it. The British coal outlook may be stated in terms of a most unfortunate dilemma, thus :—

(1) If the rate of output goes on increasing, which, unless greater economy of use can be arrived at, is the only means by which British industry can make increase, the exhaustion of the most valuable part of British coal will take place well within the period mentioned by Sir William Ramsay, viz. 175 years, which is a very brief period in the history of a nation.

(2) If British coal production declines, as hinted at by the Home Office, and if that decline is not due to coal economy, but to

decreased British industry, then the postponement of coal exhaustion will merely mean a nation in industrial decline.

We see, then, that examination of the contents of the coal-mines of the United Kingdom, and of the probable duration of their best supplies, presents some exceedingly serious national considerations. The neglect of these considerations is easily first amongst the derelictions of duty which can be laid to the charge of British statesmen and the British Parliament.

As we saw at the beginning of this work, barely 150 years separates us from that backward England which, together with Wales, numbered only about 6,000,000 people, and which, together with Scotland and Ireland, numbered about 10,000,000 people. We are face to face with the fact that the passage of another 150 years may easily reduce the United Kingdom to a low status through the loss of the wonderful asset which made such extraordinary changes between 1750 and the present day.

Let us here again recall the striking passage in which Jevons, in 1865, summed up the wonderful change in British economy :—

'The history of British industry and trade may be divided into two periods, the first reaching backward from about the middle of the eighteenth century to the earliest times, and the latter reaching forward to the present and the future. These two periods are contrary in character. In the earlier period Britain was a rude, half-cultivated country, abounding in corn, and wool, and meat, and timber, and exporting the rough but valuable materials of manufacture. Our people, though with no small share of poetic and philosophic genius, were unskilful and unhandy; better in the arts of war than those of peace; on the whole, learners rather than teachers.

'But, as the second period grew upon us, many things changed. Instead of learners we became teachers; instead of exporters of raw materials we became importers; instead of importers of manufactured articles we became exporters. What we had exported we began by degrees to import; and what we had imported we began to export.'

'The latter reaching forward to the present and the future'—to the future, that is, as delimited by the continuance of that factor

which created British wealth in the last five generations.

But, since coal exhaustion will affect all coal countries, let us consider, before proceeding further, the coal of the rest of the world.

The statement printed on p. 169 shows us, as we have already noted, three great coal nations and a number of minor coal nations, the entire output of all the latter being less than that of either of the three leaders. The coal output of the vast territories of the British Empire, although it has grown, is still an insignificant fraction of the world's output. The growth in detail has been as follows :—

COAL PRODUCTION OF THE BRITISH EMPIRE

1875–1911 (in Millions of Tons)

Year	British India	Australia	New Zealand	Canada	South Africa	Total
1875	0·6	1·4	—	0·9	—	2·9
1885	1·3	3·1	0·5	1·7	—	6·6
1895	3·5	4·3	0·7	3·1	1·3	12·9
1905	8·4	7·5	1·6	7·7	3·6	28·8
1911	12·7	10·6	2·1	10·1	6·8	42·3

Each individual portion of the Empire is seen to be as yet quite insignificant in point of coal output. Nevertheless, several parts of the Empire have enormous coal areas. India is estimated to have coal-fields nearly three times as great in extent as those of the United Kingdom, but area does not account for much in estimating the value of a coal-field, and it does not appear that either in accessibility or in heating power the coal of India can compare with the product of the great European coal-fields.

The coal of Australia has been worked for over a century, and New South Wales alone has a coal area of between 20,000 and 30,000 square miles. Although coal has been mined at the Australian Newcastle since the beginning of the nineteenth century, however, it will be seen that the entire Australian annual output is still less than 11,000,000 tons, and, according to one estimate, the workable coal of New South Wales would only last for about fifty years if produced as rapidly as we work coal in the United Kingdom. New Zealand's coal has been estimated at a mere 1,200,000,000 tons, which is as much coal as we produce in the United Kingdom in four years.

As to Canada, there are good coal-fields on both the Atlantic and Pacific seaboards, and the Canadian coal area has been estimated to cover no less than 65,000 square miles. The accessibility and value of Canada's coal, however, have not yet proved themselves in a considerable output, the production for 1911 being scarcely more than 10,000,000 tons, as compared with the 443,000,000 tons of the United States. Indeed, it is the vast difference between the value of the coal-fields of the United States of America and Canada which accounts for the fact that the United States, in 1914, has about 98,000,000 people, while Canada has about 7,000,000. It is to be expected, however, that railway development will considerably increase the Canadian output in time to come.

South Africa has a small amount of workable coal, but as far as present knowledge goes, there does not seem any reason to apprehend that any part of Africa will ever be counted among the great coal producers.

It is not a little strange, this contrast between the head and front of the British Empire and the great territories which we paint red on the maps. Small as is Great Britain in

point of area, it produces about seven times as much coal as the whole of the rest of the Empire put together. Even if it were otherwise, the possession of coal by the British Empire would be of little or no value to the industrial power of the United Kingdom, for, as we have already explained, coal is an asset which is valuable for competitive purposes only at the place of production.

If Canada had coal-fields as rich as those of the United States, it would avail the United Kingdom nothing. Indeed, it would avail us less than nothing, for it would mean that Canada would make a greatly-increased call upon our people and drain the United Kingdom of its population. If this year great coal-fields, such as those of Pennsylvania, were opened up in Ontario, the heart of the British Empire would be weakened by a greatly stimulated emigration, and Canada would, in the course of not many years, become one of the great powers of the world, at the expense of the United Kingdom. She would soon become a second United States and the chief State of the British Empire, utterly dwarfing the Mother Country.

With regard to foreign competitors, the

serious rivals are the United States of America, Germany, and China.

As to the last-named, there is good reason to believe that the Chinese coal-fields are even richer than those of America. She is equally rich in bituminous coal and in anthracite. The coal-fields in the province of Shansi appear to be the richest in the world. China is thus the dark horse of the world of coal, and if coal remains the arbiter of industrial greatness, and if the Chinese adopt the methods of the West, she may become one of the world's chief industrial Powers.

It is of more immediate interest to consider the two existing great coal rivals, Germany and the United States of America.

The figures relating to German output, given on p. 169, refer to both coal and lignite. The coal power of Germany is frequently understated by omitting her great lignite production, which now reaches over 70,000,000 tons a year. The value of lignite fuel is to that of coal approximately in the ratio three to five, and this somewhat discounts the German aggregate figures.

According to the latest German investigations, the three principal coal-fields, the

Upper Silesia, the Rühr, and the Saar, contain twice as much coal as the coal-fields of the United Kingdom. In 1904 Simmersbach, estimated the available coal supply of the German Empire at over 415,000,000,000 tons, whereas, as we have seen, the last Royal Commission on British coal supplies estimated the British coal resources in proved and unproved fields at about 150,000,000,000 tons. In each case the estimates contain a considerable element of conjecture, so that a too close comparison of them would be unjustifiable. It certainly appears, however, that the coal resources of Germany are greatly superior to ours, apart from her considerable resources in brown coal or lignite.

We now come to the consideration of the coal-fields of the United States. They are so extensive and remarkable that, with the reservation as to China already made, they put the United States in a class by herself as a coal country. Coal exists in twenty-seven states, and the coal-fields are estimated to have an area of 335,000 square miles, as compared with the 12,000 square miles of the British coal-fields. But the contents of the American fields are even more extraordinary

than their area. They are estimated at 1,400,000,000,000 tons, as compared with the 150,000,000,000 tons of the United Kingdom. Bringing together the figures we have quoted for the three leading coal nations, we get this statement :—

COMPARATIVE COAL RESOURCES OF BRITAIN, GERMANY, AND AMERICA

	Tons
United Kingdom	146,000,000,000
German Empire	415,000,000,000
United States	1,400,000,000,000

These figures, even when every allowance is made for their partly conjectural character, give the United States an overwhelming advantage. Nor do they, indeed, sufficiently exhibit that advantage, for the United States' coal is not only plentiful but good in quality, and, as to a great part, easily accessible.

America still possesses vast quantities of coal that can be worked without shafting, a fact which makes the heavy loss of life amongst her coal-miners the greater disgrace to her.

The accessibility and cheap working of American coal is reflected in the low price at which she gets her fuel, although her miners are, of course, paid a much higher wage than

obtains in any part of Europe, the United Kingdom included. Upon this all-important point, the following statement is taken from the Board of Trade's *Coal Tables* :—

PRICE OF COAL (AVERAGE) AT PIT'S MOUTH

Year	United Kingdom	U.S.A.	Germany*
	S. D.	S. D.	S. D.
1885	5 2	6 8	5 2
1895	6 0	4 9	7 1
1905	6 11	5 8	8 8
1910	8 2	5 10	10 0
1911	8 2	5 11	9 9

*Not including lignite.

The Board of Trade point out that in comparing the coal prices of different countries, or for different years in the same country, it has to be borne in mind that the average prices do not represent coal of the same quality. Such variations as the respective proportions of anthracite and bituminous coal included in the total output have to be remembered.

Nevertheless, the comparison afforded by the table between the coal of America and that of Europe is very striking and significant.

We see that in 1885 both Britain and Germany produced their coal more cheaply than America. After the lapse of a quarter of a century we find the American coal prices have fallen, while those of Britain and Germany have appreciated considerably. As between Britain and Germany the advantage in point of price is with Britain.

The competition of America in that export market, the retention of which means so much to us, has as yet been scarcely felt. We hardly realise that America has not yet begun to feel her strength. *It was not until* 1840 *that iron was smelted in the United States with coal fuel*, so that America started nearly a century later than ourselves. It was not until the eighteen-eighties that America began to add seriously to the world's iron production.

On p. 193 is given a broad sketch of the progress of the United States as between 1860 and 1885, and as between 1885 and 1910—a period in all of fifty years. The really important line is the first one, viz. coal produced. When we compare the two periods of twenty-five years we see that, although there was considerable progress in

the first period, it was altogether eclipsed what happened in the second period, and coal statistics give us the explanation. America had not possessed coal, her p lation at the present time would certa not be one-half as great as it is, and w probably not be more than 25,000,00 30,000,000.

But possessing the marvellous powe sources to which we have referred, reinfo as they are by supplies of natural gas, mi oil, and the chief metals, the progress the United States has made is not surpri As Jevons wrote, not long after 1860, first of the years given in the table on p. 'Beyond the reach of doubt there i portion of the world's surface so natu fitted for becoming the seat of grea dustries.' The coal of America has a mighty magnet for population and industry.

What is surprising in the fifty years' ment is not that so many of the items enormous increase, but that some of exhibit small increase or decline. I re especial to the items: exports of r factures, and ships engaged in foreign

PROGRESS OF THE UNITED STATES IN 50 YEARS

	1860	1885	1910
Coal Produced (tons)	13,000,000	99,000,000	448,000,000
Population ..	31,400,000	56,100,000	92,200,000
Pig-iron Produced (tons)	800,000	4,000,000	27,300,000
Copper Produced (tons)	7,000	74,000	482,000
Wheat Produced (bushels)	173,000,000	357,000,000	635,000,000
Cotton Produced (bales)	3,800,000	6,600,000	11,965,000
Petroleum Produced (gallons)	21,000,000	918,000,000	8,801,000,000
Railways (miles)	31,000	128,000	250,000
Immigrants ..	150,000	395,000	1,041,000
Imports (dollars)	354,000,000	577,000,000	1,557,000,000
Exports (dollars)	334,000,000	742,000,000	1,745,000,000
Exports of manufactures only (dollars) ..	48,000,000	150,000,000	767,000,000
Ships in Foreign Trade (tonnage) ..	2,500,000	1,300,000	800,000
Ships in Home Trade (tonnage) ..	2,800,000	3,000,000	6,700,000

We see that the ocean shipping of America has actually decreased, and that in 1910 the exports of manufactured goods—products which the United States is so naturally fitted to produce—were worth little more than £150,000,000, whereas, in the same year, the exports of manufactures by the less favoured United Kingdom amounted to £343,000,000, those of the German Empire to £236,000,000, and those even of France to £138,000,000.

The explanation of the decline of American ocean shipping and of the restricted character of the American exportation of manufactured articles is to be found in her illiberal commercial policy. Through the operation of a succession of heavy tariffs, the United States has renounced the great shipping and export trade which she might have possessed. It is of great moment that we should realise this, because the United Kingdom has gained by the self-imposed disabilities of America. It is impossible, however, for the present position to continue. In 1913 the United States enacted a new tariff which, by cheapening American costs of production, will release her activities in respect of exports, and the expansion of her commerce both in

imports and exports will, of course, greatly affect her shipping.

In 1914 we are within measurable distance of the completion of the Panama Canal, which is expected to open for traffic in 1915, with effects upon American trade and American shipping which are likely to be of a remarkable character. The cutting of Panama amounts to an alteration of the world's geography which gives great differential advantages to the American nation as compared with European nations, and because the United Kingdom has the chief commerce and overwhelmingly the greatest shipping in the world, it is an alteration which has its menace for British wealth. The subject demands our serious attention here.

When De Lesseps, working in a world which had been unused since ancient times to large-scale enterprises of the kind, cut the Suez Canal, he did a thing which made an enormous difference to European trade, and particularly to British trade with Australasia and the Far East. Although the Suez Canal is, in 1914, only forty-five years old, it has made a great difference in the world's commercial assets, and has conferred great wealth

upon Britain as the nation best able to take advantage of it. We have now to see what the effect of the cutting of the Panama Canal will be upon our commerce, which has so far benefited by the existence of the Suez waterway.

The first thing to observe is that the cutting of Suez accomplished for us what the Panama Canal also accomplishes in respect of our communications with the Far East. If the Suez Canal had not been made, the Panama Canal would advantage us greatly in our connections with the Orient, but as we have the Suez route the new Panama route does not matter much to us in this regard.

On the other hand, the Atlantic coast of the United States of America, which is now cut off from communication with the Orient by the great tapering territory of South America, which extends south as far as the fifty-fifth parallel of latitude, gains a great new advantage by the Panama route. That is to say, American Atlantic ports are given the opportunity to trade with Japanese, Chinese, and other Eastern ports. The official American Isthmian Canal Commission and

the American Special Commissioner of Panama Traffic and Tolls have issued striking reports showing how great the American advantages will be, and we shall do well to take note of them.

The voyage from New York to Japan will be shortened by about 3700 miles. As things are, a vessel sailing from New York to Far Eastern ports has to travel eastward, via the Suez Canal. When the Panama route becomes available the voyage will, of course, be westward instead of eastwards.

A remarkable saving will be made in the voyage from New York to Sydney. Under present conditions, the route is eastward, round the Cape of Good Hope, a journey of about 14,000 miles. Travelling westward, via Panama, the journey will be reduced to about 10,000 miles.

Thus the Panama Canal gives an enormous gain to the American Atlantic ports, in which we do not share, or in which we share little. We may put it that the existing handicap of American Atlantic ports in their communications with the Far East is removed, and that consequently there is loss to us in competition with them.

In this connection the gain of Canadian Atlantic ports and of the West Indian Islands is of importance. Canada's Atlantic ports gain with those of the United States, which means that the United Kingdom will suffer in competition with them also. The British West Indian Islands stand to gain enormously through the Panama enterprise.

In the ordinary Mercator map of the world, as sold in this country, the United Kingdom is obligingly placed in the centre of the picture. To realise what the Panama Canal means to America, we shall do well to draw a Mercator map of the world with the United States in the centre of the picture. That done, we see how America's central position in the world, with a fine seaboard facing the two great oceans, will be changed by her wise State enterprise at Panama.

The two great American seaboards will, for practical purposes, be made one by the new waterway. As things are, a voyage from New York to San Francisco means a long journey right round South America. With the canal available, a ship voyaging from New York to any port north of Panama Canal on the Pacific coast of America will have

its journey shortened by no less than 8400 miles, as compared with the present route.

Or, take the voyage from New York to Pacific coast ports of South America. This will be shortened by from about 1000 to 8000 miles, according to whether the port is nearer to the Canal or to the southern extremity of the Continent. It is equally true, of course, of United States ports on the Pacific coast, which will make great gain in their connection with South American ports on the Atlantic side. The new character of the connection between the Pacific coast of America and Europe should also be noted. A ship travelling from this country through the Panama Canal to any American Pacific port north of Panama will have its journey shortened by 6000 miles.

Voyages from Europe to South American Pacific ports by way of Panama are also greatly shortened, unless the ports are towards the southern extremity of South America. Observe, however, that the gain via Panama for a journey from Europe, as compared with the Cape Horn route, for ports on the American Pacific coast, is relatively not so great as the gain made in a journey from

New York, and that in this respect Panama means more to the Americans than it means to us.

Let us compare the existing position of Liverpool and New York in relation to San Francisco. As things are, the voyage in each case is now made round the Cape of Good Hope. That is to say, Liverpool is by sea almost as near as New York is to San Francisco. It is an extraordinary position. Given the Panama Canal, however, the port of New York is brought 2750 miles nearer than Liverpool to San Francisco. Where there is now a position of equal advantage there will in future be a great handicap for Liverpool.

The illustrations might be multiplied, but enough has been said to show that we may accurately sum up the change made by Panama by saying that it will deprive Europe of the relative advantage which was given to its ships by the cutting of Suez, while giving America relative advantages in other directions.

British shipping is likely to suffer through the audacious enterprise at Panama. We have already seen that the restrictive

commercial policy of America, which in the past has impeded both her imports and her great natural exporting power, has enabled Britain to do a shipping trade which America ought to have done. We have profited by American folly, and the extraordinary domination of British shipping is partly explained by the fact. The character of that domination may be pointed out here :—

MERCHANT NAVIES (OCEAN SHIPS) OF THE CHIEF COMMERCIAL POWERS, 1910

Country	Steam and Sailing Ships	Steamships only
	Tons	Tons
United Kingdom	11,600,000	10,500,000
United States	792,000	557,000
Germany ..	2,900,000	2,400,000
France ..	1,500,000	800,000

In 1913 the United Kingdom possessed about one-half of the aggregate ocean shipping of all the world, and even this statement does not fully express the truth of the matter. As a larger proportion of British than of foreign ships consist of the latest and best types of

vessels, the effective tonnage of British ocean shipping amounts to certainly more than one-half of the aggregate possessed by all the world. It is probable that the earnings of these ships are equivalent to a British export of services (invisible exports, as Sir Robert Giffen called them) worth £120,000,000 a year. To put it in another way, £120,000,000 worth of the imports which sustain us are earned by this wonderful British mercantile marine.

The domination of British shipping is partly due to native ability, partly to the geographical position and advantages of the United Kingdom, partly to the free commercial policy which has made her a free market for all the world's commodities, partly to the extraordinary advantage of coal exports, and partly to the restrictive commercial policy of some other nations, notably the United States.

In natural advantages the United States is easily our superior, and we are now approaching the period when America will avail herself of those natural advantages. Her imports and exports will grow with the adoption of a saner commercial policy, and

her geographical position will be enormously advantaged by the Panama Canal.

Changes of a serious character are likely to ensue in the world's trade, and it is difficult to see how the United Kingdom can maintain her present relative mercantile position. It is a position which is so artificial that it will need great British enterprise, not merely to prevent the loss of the present relative position, but to maintain the existing aggregate of her tonnage.

It has seemed to the present writer, who has very closely studied this matter of the American Panama enterprise, and of the general development of the American continent, that it is not a little astonishing that Great Britain has come to the decision not to be officially associated with the great Exhibition which is to be held at San Francisco in celebration of the opening of the Panama route.

The British Empire is, of course, a great American power, and as such is vitally interested in Panama, not only in respect of the Mother Country, but in respect of the Dominion of Canada, of the West Indian Islands. and of possessions in South America.

British trade with the American continent in general is very great, and capable, given due enterprise, of considerable extension. The following is an approximate estimate of the present population of America :—

AN ESTIMATE OF AMERICAN POPULATIONS
(1913)

United States of America ..	97,000,000
Canada	7,500,000
Newfoundland	200,000
Mexico	16,000,000
Argentina	6,800,000
Brazil	18,000,000
Chile	3,500,000
Peru	3,800,000
Bolivia	2,000,000
Uruguay	1,200,000
Nicaragua	500,000
Costa Rica	300,000
Guatemala	1,900,000
British Guiana and Honduras ..	300,000
British West Indies	1,700,000
Colombia	4,000,000
Panama	400,000
Ecuador	1,200,000
Honduras	700,000
Grand Total ..	167,000,000

British trade with the rich and varied territories inhabited by these 167,000,000 people will be seriously influenced, as we have

seen, by the cutting of Panama, and the matters that we have surveyed in this chapter are fraught with momentous consequences for the future of the United Kingdom.

So far we have gone upon the assumption that coal will remain in being as a great industrial force, conferring peculiar benefits upon those who possess it, and therefore conferring correlative and peculiar handicaps upon those who possess it not. We have now to pass to the consideration of alternative sources of power, and how they may influence the future of the world's wealth, and, in particular, the wealth of the United Kingdom. We have seen that Germany has more coal than Britain and that America has much more coal than Germany. We now pass to some important cognate considerations.

CHAPTER XI

THE FUTURE OF POWER

WHEN the question of the exhaustion of British coal is raised, how often we hear it remarked that we need not trouble ourselves about that question, because long before our coal is exhausted science will have produced a better source of power. It is a remark which shows how widespread is misunderstanding of the British national economy. Let the reader take a map of the world and remind himself of the territories and of the nations thereof. Let him observe a small group of islands well placed at the Atlantic Gate of Europe, and let him ponder anew the cause which has given them, small as they are, a large population, which has given them one-half of the shipping of the world, and which pours into their cities a constant stream of commodities drawn from the three corners of the world.

Let me restate, for it is all-important, that

it is not merely the possession of coal which is the cause of British wealth; it is that Britain is one of the three white nations which possess plentiful, good, and well-situated coal. That is to say, we possess an asset which is possessed by few nations in the world, an asset which for long we were alone, even amongst that few, in being able to work. During the long period of undisputed supremacy based on coal, between 1770 and 1870, it was not unnatural that the British people should come to regard themselves as possessing peculiarly natural qualities for industry and trade which other people might not aspire to.

That is why the rise of Germany, since she attained national unity, and the rise of the United States, since she obtained a sufficient population, came as startling surprises to all but a few well-equipped observers. The rise of Germany was greeted with a mingling of fear and derision. We have now almost forgotten the 'Made in Germany' cry of the eighteen-eighties, which was uttered by some people as a taunt and by others as a reproach. Then there came a day when a proud German vessel sailed into a British port with the

motto 'Made in Germany' displayed upon her prow, and Britain gradually came to realise that Germany had arrived. It is exceedingly doubtful, however, whether it is yet generally conceived that the secret of German success is the secret of the success which Britain won at an earlier date—the possession of the advantage of a splendid coal supply.

As with Germany so with America, with this difference, that as America, through an enormous immigration, has been provided in each succeeding year with a miraculously expanding population, and as she adopted a very restrictive commercial policy, her exports of manufactures did not so readily appear in our markets as those of Germany, so that many people took alarm about Germany who did not realise that America, to use a properly American term, was a much bigger proposition. Again the secret of the American advance is the secret of the British and of the German advance, the possession, not merely of coal, but of the special advantage of being one of the three white nations possessing good, plentiful, well-situated coal.

Let us suppose that science dethroned coal

by placing at the disposal of man a better source of power than coal affords. It will be perceived upon consideration that it is *most unlikely that that new source of power would be, as coal is,* the almost exclusive possession of three white nations.

We saw in Chapter X that Britain, Germany, and America between them produce nine out of every eleven tons of coal produced by all the world, which is the same thing as saying that in large scale power production these three nations are in a class by themselves. But if coal were dethroned by a new source of power, it is so improbable as to be dismissed as impossible that that new source of power, whatever it might be, would belong to Britain, Germany, and America, as compared with the rest of the world, in the proportion of nine-elevenths, or 82 per cent. of the whole.

If a substitute for coal-power arose, and that power were equally usable by all nations, France would be levelled up with England or Germany in industrial power. Similarly, Canada would be on level terms with the United States. *The special advantages given by coal would disappear; the*

special disadvantages which now arise from lack of coal would equally disappear.

If the new source of power were not equally usable throughout the world, but were distributed capriciously as coal is, then a new series of special advantages and special disadvantages would arise. Some nations that are now depressed would be exalted, and other nations which have now a peculiar prosperity would be put down.

With these considerations in mind, let us now turn to possible substitutes for coal, as far as they have been yet either used in practice or suggested in theory.

Mineral oil is frequently spoken of as a substitute for coal. In one sense it is not a substitute, because mineral oil may be described as a natural distillation from oil and shale, and indeed it is possible to convert coal into oil by artificial means. It does not appear that the world possesses natural supplies of mineral oil which are in any way comparable in point of magnitude with the world's coal. As to oil production as it is, it is entirely unfavourable to our industrial and commercial position, as will be gathered from the following facts as to the world's

petroleum production, collected by the Board of Trade :—

THE WORLD'S PETROLEUM PRODUCTION, 1911

	Gallons
United States	7,713,000,000
Russian Empire	2,315,000,000
Dutch East Indies	426,000,000
Rumania	388,000,000
Austria	367,000,000
British India	226,000,000
Japan	58,000,000
Germany	36,000,000
Canada	10,000,000
Trinidad	4,000,000

Here we see the United States figuring as easily first, producing far more petroleum than all the rest of the world put together. Apart from Russia, there is no other great output in the list, and, as need hardly be said, the United Kingdom is not placed in it at all. A little oil could be got from such oil shales as we have in Dorsetshire, but the output at the best would be so small as to be insignificant and negligible in connection with the great subject we are discussing.

The Coal Commission, in its Report of 1905, summed up the position with regard to oil very well when it said :—

'There has been much disposition in recent years to speak of oil fuel as if it were a serious competitor of coal and a real substitute for it. The facts before us do not bear out that view. Dr Boverton Redwood, in his evidence, has given us a valuable account of the present and prospective sources of supply of petroleum and its allied products, and while he thought there was ample scope for energy and capital in searching for and opening up fresh sources of supply, he expressed himself very strongly against the possibility of any largely extended use of petroleum as a substitute for coal. He pointed out that the world's production of coal in 1901 was 777,000,000 tons, and that in the same year the world's production of petroleum was 22,000,000 tons, or only 2·8 per cent. of the weight of the coal.

'The conclusion we have arrived at as regards the use of oil fuel in this country is that which is expressed by Dr. Boverton Redwood when he said: "I think there will be certain selected applications of liquid fuel where the advantages of employing such a fuel are especially obvious, but for anything like general employment I cannot see where we are to look for adequate supplies." Mr

Beilby was also very definite on this point, and he thought that no extensive use of oil fuel is likely to take place in this country, as 'the home supply is inadequate and the prices fluctuate too greatly, nor could he see how it would be possible to import oil in bulk at a price sufficiently low to compete with coal.'

There is, however, one aspect of the oil question which did not appear to have the attention of the Royal Commission on Coal Supplies, but it is of vital importance in connection with our inquiry. We refer to the fact that it appears to be increasingly probable that oil will supplant coal in supplying power to ships. For the purposes of warships coal is already doomed, and nothing is more likely than that, whether for raising steam or for some form or other of internal combustion engine, oil fuel will actuate the mercantile marine of the future. If this change comes about, the British mercantile marine will lose a peculiar advantage which it now possesses, and which has been already explained in these pages.

As we saw in Chapter III, the imports of the United Kingdom chiefly consist of food

and raw materials which are bulky or heavy, and which therefore employ many vessels to bring them to our shores. We do not export food, however, save a trifling amount in manufactured form, and of the raw materials of industry we export only about £16,000,000 worth per annum. Our exports chiefly consist of manufactured articles, which have comparatively little bulk in relation to value as compared with raw materials and foods. Therefore, if we had no other exports, a large number of the ships which bring foods and materials to our shores would have to go out again in ballast, earning no freights.

Fortunately for us, however, we have a magnificent export trade in coal, *largely for the use of steamships abroad*, who pick it up at coaling stations. Therefore this coal export serves to balance our imports in point of bulk. The table given in Chapter III., p. 71, will assist the comprehension of this very important point, and it will be understood from it how much British shipowners gain by our enormous and growing coal exportation. And it should be remembered that the coal exports mentioned in the table do not include the bunker coal of ships

leaving our shores, but only such coal as is cargo.

It will be perceived that if oil dethrones coal for the purpose of ship power, our coal exports will very largely fall off. Two consequences will ensue. The first is that British coal will be by so much conserved, which is a good point. The second is that a heavy blow will be struck at British shipping, which is a very bad point. One of the most profitable classes of freightage handled by British shipowners will be greatly diminished. This point, it will be seen, is independent of the dethronement of coal as a general industrial power, but the same result would, of course, arise if coal were generally dethroned for all purposes as well as for the specific purpose of ship-power.

There has been a very considerable development in the economic utilisation of water-power during the last twenty years. Mountain streams and falls of varying dimensions have been successfully harnessed in the Old World and the New, and a new water-power engineering has sprung up outside these islands. Not only such great natural powers as exist at Niagara are being utilised; in

many parts of Europe, conspicuously in France, Italy, and Switzerland, great progress has been made in the working of what is appropriately termed 'White Coal.' Where water-powers exist, as in the Alps and the Apennines, new seats of industry are arising which are independent of coal, and which are, indeed, better favoured than coal regions, inasmuch as the power is got without smoke and dirt, and the source is inexhaustible.

When I was in South Germany a few years ago I found it was hoped to make Munich one of the greatest manufacturing centres in the world, with the water-power of the neighbouring Bavarian Alps as a base. South America will probably see great water-power developments in the near future, in which case the rich raw materials of that part of the world may come to be worked up at or near their places of origin, instead of being exported as they now are to the great coal countries.

Unfortunately, the United Kingdom is very badly off indeed in respect of water-power. Scotland has some small potentialities, but Professor Forbes, in evidence before the Coal Commission, estimated that if the whole

of the available water-power of the United Kingdom were economically employed, it would be merely equivalent to the use of 1,200,000 tons of coal per annum. In other words, our water-power is negligible.

We may pass by the problems of the utilisation of tide-power or solar heat. It does not appear that either of them are yet within range of practical employment.

It is of more interest to consider briefly the new speculations which have arisen in connection with the discovery of radio-active substances. Becquerel, in the closing years of the nineteenth century, found that salts of uranium possessed radio-active properties and were capable of affecting photographic plates. Crookes, by further experiment, proved that the radiation was not due to the uranium salts, but to some unknown impurity. Madame Curie next discovered that the minerals pitch-blende and chalcolite were more radio-active than uranium, pointing to the existence of some exceedingly radio-active element. A piece of pitch-blende was found to make an extraordinary impression upon a photographic plate. Madame Curie then set herself to the task of analysing pitch-blende, which derives

its name from the fact that it is a black mineral resembling hardened pitch. After prolonged experiment she extracted the new and marvellous element in the form of radium chloride.

The delicacy of the investigation may be gathered from the fact that in 5,000,000 parts of the best pitch-blende—that of the Austrian mine—there is only one part of radium, so that 150 tons of pitch-blende would yield only one ounce of radium. So intense is the radio-activity of radium, however, that, according to Professor Soddy, a quantity of one three-thousandth-millionth of a grain is easily recognisable.

The extraordinary character of the radio-activity of radium may be gathered from the consideration of the little instrument called the spinthariscope, which was invented by Crookes. It consists of a small brass tube, in the interior of one end of which is a fluorescent screen. At the other end of the tube is a magnifying lens by which the screen is viewed. Placed at a short distance away from the fluorescent screen is a watch hand, which has on it an infinitesimal particle of radium. That particle is placed on the

watch hand by the simple process of dipping the tip of it into a solution of nitrate of radium in water. A drop of the solution is thus taken up, and when the water has evaporated it leaves behind a mere trace of radium, perhaps one two-thousandth part of a grain.

If the screen is viewed through a lens in a dark room, it is seen to be bombarded by emanations from the radium, and scintillations of light appear which are continually flashing and dying away again. Although the particle of radium is so microscopical, it continues to emit emanations year after year, and indeed generation after generation. The fluorescent screen will wear out, but not the particle of radium.

The marvellous energy stored in the substance may be gathered from this fact. It is estimated that one pound and a half of radium would yield sufficient energy to drive an engine of one-man power for over 1000 years. This peculiar property of giving out enormous energy without perceptible wasting, brought science face to face with new and marvellous problems, and in the few years since 1902 (I write early in 1914),

we have already gone far in theory and speculation.

In previous chapters we have seen how modern wealth has arisen from the exploitation of new stores of energy, stores which are wasting year by year. We have been reaping, and are reaping, where we have not sown. It will be perceived that the new problems raised by the discovery of radio-active substances capable of yielding undreamed-of stores of power, has a most important bearing upon the future of wealth production and the destiny of mankind, and the fate of the various nations into which mankind is grouped.

It would be without the scope of this work to attempt to give a full account of what has been discovered with regard to the properties of radium and its remarkable emanations. Let it suffice to say that in the radio-activity of radium it appears that we have the exhibition of the disintegration of matter—the transmutation of an element—and as a consequence of that disintegration and transmutation the release of an extraordinary amount of energy.

Radium is conceived, not as possessing a peculiar property, but merely as giving an

exhibition of that property in a peculiar degree. Radium, which before our eyes is being transmuted into an emanation which again changes its form and yet again, is itself the child of previous disintegrations. The association of radium with uranium is indeed explained by the fact that uranium is the parent of radium, and that the only difference between the radio-activity of radium and the radio-activity of uranium is that whereas the disintegration of radium is comparatively swift, the disintegration of uranium is, by comparison, exceedingly slow.

But are we to regard radio-activity as confined to one particular set or series of elements? The answer is that it is impossible thus to isolate these particular substances. Radium appears to be closely allied to other elements which do not possess radio-activity, *e.g.* calcium and barium. We arrive logically at the conclusion that the wonderful internal store of energy which radium unlocks is also possessed by, but locked up in, all non-radio-active substances, which is to say, in the entire material of our world and indeed of the cosmos.

It is a startling and inspiring conclusion.

We have to regard apparently inert matter as energy asleep, awaiting the wand of the scientist. If we could learn to unlock the atoms constituting the substances which the old chemistry regarded as elements, as things untransmutable, but which the new chemistry regards merely as different exhibitions of the same thing, and therefore transmutable, unlimited control of power would be ours.

The wealth of Britain, we have seen, is based upon the unlocking of the secret of coal power. Will the world some day learn to base an infinitely greater wealth upon the infinitely grander discovery that all matter is a giant asleep, and that the giant may be harnessed? At present we have just learned the nature of the problem to be solved. As Professor Soddy says, in his *Interpretation of Radium*, 'The energy which we require for our very existence, and which Nature supplies us with but grudgingly and in none too generous measure for our needs, is in reality locked up in immense stores in the matter all around us, but the power to control and use it is not yet ours. What sources of energy we can and do use and control, we now regard as but the merest leavings of Nature's primary

supplies. The very existence of the latter till now have remained unknown and unsuspected. When we have learned how to transmute the elements at will, the one into the other, then, and not till then, will the key to this hidden treasure-house of Nature be in our hands. At present we have no hint of how even to begin the quest.'

We have considered some certainties and some uncertainties, some statements of fact and some matters of intelligent speculation. We can now usefully proceed to consider our national position and our national duty in regard to the future.

CHAPTER XII

THE NATION'S DUTY

THIS is certain, that coal will pass. Whether or not science offers an alternative supply of energy, the world sooner or later must lose its coal. That loss, in the event of the invention of no alternative power supply, must reduce the nations that are based on coal to a much lower estate. As the best supplies of coal in the world become exhausted, those nations with inferior coal resources will be levelled up in point of natural opportunity, and the marked prominence of Britain, Germany, and America must disappear. Of these three, considered as a group, we have seen that America contains much more good coal than the other two, and that Germany probably contains coal resources superior to our own. Thus, assuming the continued value of coal, Britain, Germany, and America will undergo a relative industrial decline in the order named.

The probability is, however, that science will dethrone coal long before the world has consumed the best of its coal. The end of the nineteenth century and the opening years of the twentieth have witnessed an unparalleled scientific advance. So true is this that if, in 1914, a man of middle age relies upon the scientific studies which he made in his youth or in his early manhood, he finds himself lamentably lacking in equipment to understand the world he lives in.

And let us note here another strong probability to which we have had occasion to refer already. It is, that if and when we are gifted with a new great source of power, it will probably be one exercisable indifferently over a wide area of the world. That is to say, the new source of power will probably equalise industrial advantages between the nations, so that each of them will find itself with a fair field and no favour in point of power production.

What, then, should be the national duty in view of these considerations? How far is it possible for Britain to help herself by way of securing her future and of handing on to posterity social and industrial

institutions which will avail in the time to come?

We can no more prevent the certain effacement of our existing industrial advantage than we can prevent such minor alterations in the balance of commerce as are exemplified in the cutting of the Panama Canal or the adoption of oil as the source of energy for ships, but what we can do is to make preparation for the great change which is bound to ensue sooner or later. We do not know how long a time of preparation is before us; it may be no more than half a century, and fall within the lifetime of some of those who read these lines; it may, on the other hand, be postponed for several generations. If coal civilisation proves yet to have a long life, so much the better for Britain, but she fronts so many uncertainties in this connection that we shall do well to steer upon the presumption that the time will be short.

Looking at the matter from the point of view of national organisation, it is clearly our duty, in the first place to conserve our power resources, and in the second place so to train our people that in the event of their coal resources becoming either relatively dear

or altogether obsolete, they will be able, when no longer backed by a peculiar economic advantage, to work at least upon level terms with other nations.

And first, as to coal conservation.

The relation between the governance of Britain and the British national economy has, in the coal era, been one of studied disseverance. It is not a little remarkable that a nation whose greatness depends upon its coal should have no sort or kind of control over, or survey of, the sources of its wealth.

In so far as there are laws relative to coal-mines, they have been placed upon the Statute Book either at the call of humanity or of organised labour. At first there was no interference, and little children of six and seven years were used as beasts of burden in the mines. Few or no precautions were taken to prevent loss of life. The men were unprotected as to the measurement of the coal which they sent to the surface as the result of their labour.

Gradually and very timidly a body of law was built up, and in 1914 a child may not descend a mine until he is thirteen. There are numerous laws, often more honoured in

the breach than in the observance, for the protection of the lives of miners, and a piece-worker has the assurance that when his wagon of coal reaches the top of the shaft it will be weighed in the presence, not only of a man employed by the colliery, but of a man employed by himself and his fellows.

These things have been done, and as a result of legislation we have so far improved mining conditions that in an average year our coal mines do not kill more than about 1500 men and boys, or injure more than about 150,000—figures which are appalling enough, but which compare quite favourably, in proportion to numbers employed, with the terrible mining statistics of the bad old days.

If humanity has not worked to a more glorious consummation, we can at least lay the flattering unction to our souls that the nation which Napoleon is said to have described as a nation of shopkeepers has, at any rate, had more regard to humanity than to the conservation of the thing from which it derives so much honour and dignity. There is not one single line in the British Statute Book which compels any man to

use wisely, or to prevent him from using wastefully, the chief national asset.

All that we have done in the period of about 150 years, during which coal has built up the nation, has been to appoint the two Royal Commissions already referred to. We have never made an adequate national survey of our coal resources, and we have entirely resigned them to private control and exploitation. Indeed, we have been so successful in blinding ourselves to the national importance of the subject, that probably not one adult in 10,000 of our population has any full realisation of the relation of British wealth to British coal.

What we need is a permanent National Power Commission.

The United States of America, enormously more gifted than Britain, has already established, upon the wise suggestion of ex-President Roosevelt, a National Conservation Commission, which is surveying the magnificent resources of the United States. Those resources, in spite of the waste accomplished by an irresponsible capitalism, are still so much greater than ours, that our production of primary materials is poor indeed when

compared with that of America. Here is such a comparison, made for the latest year for which I can obtain comparative figures for the two countries :—

NATURAL RESOURCES OF BRITAIN AND AMERICA

Production in 1911 of	United Kingdom	United States
Coal (metric tons) ..	276,000,000	450,000,000
Iron Ore (metric tons)	5,000,000	24,000,000
Copper (metric tons)	398	498,000
Silver (kilos) ..	4,000	1,879,000
Petroleum (gallons)	—	7,713,000,000
Cotton (bales) ..	—	16,000,000

Let us ponder these, for us unfortunate, comparisons, and remember that in spite of them it is the United States of America which has had the wisdom to establish a National Conservation Commission, and it is the United Kingdom which is still content to let her one great asset go unexamined, as though it mattered nothing to her. Mr Roosevelt, in his message from White House, dated June 8, 1908, spoke of American natural resources as

'being consumed, wasted, and destroyed at a rate which threatens them with exhaustion.' What of our own?

Nature never gave to Britain what she gave to the United States, and it matters little or nothing to us whether the trifles of copper, zinc, lead, etc., in British mines, become entirely exhausted. The more reason that the one great asset we possess, coal near the sea, drawing raw materials irresistibly to it, should be considered and safeguarded. If there is a problem before America which has led her governors to establish such a Commission as I plead for in this country, how much greater the need here.

There is no sign whatever of an awakening to that great need. On the contrary, many earnest reformers amongst us are engaged in organising one sole representation, which is that 'land' is the source of British wealth, and that it is possible by reforms connected with its tenure, and especially in connection with agricultural operations, to magnify British wealth and erase poverty.

As a matter of fact, if every possible rood of British land was put to the best uses of

agriculture, and that were the sole resource of the British people, we should fall in rank to the status of a tenth-rate nation, with a population not one-half as great as Britain possesses to-day. That is not to contend that British land reform is not important; far from it. It is to put the thing into its proper perspective. It is most unfortunate that the great asset which has raised Britain to her present position is banished from the public mind. Perhaps that is hardly the correct expression, for the all-important consideration has never entered the public mind, and can scarcely therefore be banished from it.

The United States Commission has been erected not a moment too soon. In the remarkable papers which have already been issued by the Commission it is demonstrated how the wanton waste of private, non-national, and irresponsible capitalists have been rapidly condemning the posterity of America to a poor condition of civilisation.

The marvellous resources of a great territory have been despoiled. What seemed, not long ago in the world's history, to be inexhaustible forests have been so reduced that, taking the

highest estimate of the timber remaining, and the largest estimate of the present replanting, Mr Gifford Pinchot, chairman of the National Conservation Commission, and chief of the United States Forest Service, estimates the duration of the American forests as 'not more than thirty-three years.'

Much of the original fertility of the great American plains has been destroyed. Natural gas and oil have been tapped as though the supplies were inexhaustible instead of strictly limited. The copper, lead, and iron mines are being creamed, so that before long the use of inferior ores will be thrust upon the nation. Above all, the main asset, American coal, is being consumed so rapidly that it is the opinion of the National Conservation Commission that the supply will be so depleted as to approach exhaustion before the middle of the twenty-first century.

'Yet,' writes the chief of the United States Forest Service, 'in the face of these known facts, we continue to treat our coal as though there could never be an end of it. The established coal-mining practice at the present date does not take out more than one-half the coal, leaving the less easily mined or

lower grade material to be made permanently inaccessible by the caving-in of the abandoned workings. The loss to the nation from this form of waste is prodigious and inexcusable.

'The waste in use is not less appalling. But 5 per cent. of the potential power residing in the coal actually mined is saved and used. For example, only about 5 per cent. of the power of the 150,000,000 tons annually burned on the railways of the United States is actually used in traction; 95 per cent. is expended unproductively or is lost. In the best incandescent electric lighting plants but one-fifth of 1 per cent. of the potential value of the coal is converted into light.'

It is impossible to resist the conclusion of the chairman of the Commission that 'the planned and orderly development of conservation of natural resources is the first duty of the United States,' or that of the National Conservation Commission itself that the welfare of the United States 'depends on conservation,' and that that conservation is 'an immediate and vital concern.' And if the United States, the most gifted nation in the world, has set itself seriously to the

planned and orderly development of its resources, to the checking and control of private exploitation, how much greater is the need of these less fortunate isles!

In the passage above quoted, the sheer waste of coal in America is dwelt upon. It is not less here in proportion to our output, and probably it is more, for I imagine that in this country the number of obsolete steam plants in actual use is much greater than it is across the Atlantic. It is only necessary to visit our industrial centres with some knowledge of engineering to see on every hand examples of inefficiency and waste.

The British Coal Commission, in its report of 1905, dwelt upon the great existing waste in the production of power. With some reason the Commissioners gave credence to the statement that 'if all steam-engines were as efficient as the best, 50 per cent. of the coal now used for steam raising might be saved.' They pointed to the great percentage of waste amongst small power consumers. The collieries themselves come in for severe condemnation in a paragraph which is worth quoting *in extenso* :—

'It is beyond question that collieries are extremely wasteful in the consumption of coal, no doubt to a large extent because of the small value of the fuel used, which is generally of very inferior quality. Taking from 6 per cent. to 8 per cent. of the output as the average consumption, it will be seen that in the year 1903 from 14,000,000 to 18,000,000 tons of coal were consumed at the collieries. Of course, there are many factors to be taken into consideration—for example, the output, the amount of haulage, pumping, etc., required, but none the less, much of this waste might be avoided. It was stated by one witness that if the whole of the plant of the collieries in the kingdom were modern plant of the best description the consumption of coal would be one-half of what it is to-day. We think it right to draw the attention of colliery managers and other persons interested to this important consideration.'

And as to the getting of coal, the Commissioners had much to say upon existing waste. They dwelt upon the small use of coal-cutting machines, and pointed out that in 1903 only 225 collieries were using such

machines, and that the number of machines employed was only 643. It is a pleasure to say that the latest figures available, those for 1912, show an improvement in this respect, the number of collieries having risen to 626, and the number of machines employed by them to 2444. Nevertheless, in 1912, only 20,000,000 tons of coal out of an output of 274,000,000 tons were got by machinery. The point is important, because the use of coal-cutting machines not only prevents waste of coal and gets it in better condition, but enables seams to be worked profitably that could not be worked by hand. It is also wiser because it saves the use of explosives.

Other points of importance in the economy of coal relate to the full utilisation of small coal, and the manufacture of coke by processes making full use of the volatile products obtained. But important as these are, they are minor considerations when compared with the growing evidence that the best use of our coal cannot be realised until we adopt a system of general electrification, convert coal into power at the pit-head or at suitable economic points, and make it almost entirely unnecessary to transport coal itself. This

important point was thus dismissed by the Coal Commission :—

'The evidence points to a future extension of central power-stations, and the generation and transmission of power upon a large scale. If such stations were established in close proximity to the collieries, there would be nothing to pay on the coal in the way of railway rates, and the question would then be, not the cost of transport of coal, but the cost of transmission of power.'

It is not a little unfortunate that the Commission, while admitting the importance of the subject, should dismiss it with so brief a reference. Perhaps it is typical of the national attitude to the matter which most nearly concerns it that after it has actually brought itself to the point of establishing a Royal Commission, and that Commission has sat for years to take evidence, we should be presented with such a paragraph as that which I have just quoted.

The electric use of our entire coal production for home purposes is a subject which has increasingly engaged the attention of our best equipped engineers. Mr S. Z. de Ferranti, when President of the Institute of Electrical

Engineers, devoted his presidential address a few years ago to giving an outline of concrete proposals to establish national power houses at the coal-fields and at other places to which fuel could be economically transported by water.

We are to imagine a hundred great centres of power emission, and the only transportation of coal in the country taking place when the power is not actually produced at the pit-head. Thus all small power-producing plants would be swept away with their hideous accompaniments of chimneys and dirt. Power would be laid on from the electrical centres as water is laid on from public reservoirs. For all power purposes whatsoever, whether for lighting or heating (public or private), transporting or manufacturing, electricity would be available.

Our centres of great population would be transformed out of all knowledge. They would become clean and healthy as it is impossible now to make them clean and healthy by any expenditure of labour and devotion whatsoever. The life of women, and especially of working women, would be utterly transformed. Domestic work would

become light and easy. Manufacturing would receive a great stimulus.

Agriculture would become a scientific industry, which would be aided not only by the use of electricity in the stimulation of plant life, but through the production of an enormous amount of nitrogenous manure as a by-product of the process. Mr de Ferranti estimates the annual supply of manure as about 150 pounds for every acre of the British area now under cultivation.

And if this were not enough, the cheap electric power would enable us to perform in the United Kingdom those processes of fixing the atmospheric nitrogen which it is not economic to carry on under present conditions here. Science has shown us how to turn the atmosphere into quartern loaves; the all-electrical scheme would enable us to employ known processes in this connection.

It is of interest to give Mr de Ferranti's conclusions. The Coal Commission, reporting in 1905, estimated that our total coal output of 230,000,000 tons in 1903 was thus used :—

COAL OUTPUT (1903): HOW USED

	Tons
Exports, plus bunker coal ..	63,000,000
Railways (all purposes)	13,000,000
Coasting Steamers, bunkers ..	2,000,000
Factories	53,000,000
Mines	18,000,000
Iron and Steel Industries ..	28,000,000
Other Metals and Minerals ..	1,000,000
Brick Works, Potteries, Glass Works, Chemical Works ..	5,000,000
Gasworks	15,000,000
Domestic	32,000,000
Total ..	230,000,000

It will be seen that, apart from coal exports, bunker coal, and coal used by gasworks, the consumption was, in round figures, 150,000,000 tons; in 1914 it is rather greater, but the figure will serve to illustrate the matter. Mr de Ferranti estimates that by the all-electric plan we could do all the work now done by using 60,000,000 tons of coal instead of 150,000,000 tons. That is to say, we could double the energy produced, and yet consume less of our coal than now.

The estimate runs that the 60,000,000 tons of coal would give 131,400 million units of electricity produced by machinery at a normal capacity of 25,000,000 kilowatts,

the national electrical plant being divided between 100 generating stations, each of 250,000 kilowatt capacity. Mr de Ferranti estimates the capital cost of the central works at £175,000,000, and the cost of the distributing plant, including local power-stations, at £325,000,000, making a total capital cost of £500,000,000.

It is a figure which, although actually large, is small relatively to the great issues involved. It is little more than £10 of capital for each unit of the population, and may be compared with the £1,300,000,000 which figures as the 'capital' of British railway companies performing a work which, although great, would be trifling when compared with the output of power for all purposes in such a country as this.

It is estimated that with such an electrical plant power could be supplied throughout the country at as low a price as one-eighth of a penny per Board of Trade unit. At such a price, power could be freely used to lighten all kinds of labour, and indeed to change our conceptions of the nature of work.

As to the possibilities of transmitting power, it was pointed out by Mr George Wilkinson,

the chief electrical engineer of Harrogate, in his presidential address to the Incorporated Municipal Electrical Association in 1912, that electrical current is already successfully transmitted in Colorado at a pressure of 100,000 volts under the severest conditions; the high tension lines at Colorado extend over 150 miles from the power-station at an altitude of 13,000 feet. In this connection we may remind ourselves that no part of the interior of Britain is removed more than 100 miles from the sea, and that it would not be difficult, therefore, to arrange for suitable economic centres of power transmission.

Such are the possibilities opened to us by the engineers. What we need is the association of the powers of Government with the powers of the engineer. At present they are either unrelated or at cross purposes. We have certain privately and publicly owned small electric plants, some of them most uneconomic in character, trifling with a great question. Vested interests are being built up, and each year that passes makes it more difficult to advance upon planned and orderly lines. We are repeating in connection with the subject of electrical power-supply very much the kind

of folly that was perpetrated by Parliament in respect of what we call our railway system —the clumsy wasteful series of monopolies and partial monopolies which do so much that need not be done and fail to do so much that needs doing.

Such a National Power Commission as I have proposed would count amongst its duties not only the survey and inventory of natural resources, but the study of and prosecution of constant experiment in means of power-supply. It would call to its aid the leading engineers of the nation, and indeed of the world. It would submit to Parliament plans of coal conservation, suggestions for practical laws of control with respect to private users, and projects for economic power production and transmission.

It will be apparent that, given such national coal conservation and economic use of power, British coal would be even more a special advantage to Britain than it is at present. As things are, we have an asset which, although clumsily used, arms us with a weapon which makes it hard for coal-less nations, or nations with a little coal, to compete with us. If we used our coal to better advantage, the

comparative economic advantages of Britain would be even more marked than they are to-day.

So much for coal conservation. But what of the period, be it near or far removed, when coal shall be dethroned, either by exhaustion or because of the discovery of a better source of power?

There are those who are inclined to dismiss this question by inquiring, as Napoleon is said to have inquired, 'What has posterity done for us?' The American Conservation Commission takes the view which will probably commend itself to the majority when it says, 'The duty of man to man, on which the integrity of nations must rest, is no higher than the duty of each generation to the next; and the obligation of the nation to each actual citizen is no more sacred than the obligation to the citizen to be, who, in turn, must bear the nation's duties and responsibilities.'

Gladstone was greatly struck by the work of Jevons, and agreed with him that in view of the nation's present use of its chief asset, it was its duty to hand on the diminished inheritance at least free of a national debt. So little regard have we, however, for our

children and our children's children, that we think it just to saddle posterity with part of the cost of such a war as that which made the Transvaal and the Orange Free State nominal parts of the British Empire.

But to hand on an inheritance clear of debt, although important, is by no means the most important of the matters which should concern us in this connection. *We ought to regard the remainder of the coal era as a period during which the British people may be prepared for their coal-less future.* We now possess the means of wealth production in ample measure. We have the means to abolish poverty in these islands, and we know how to use the means.

We have the opportunity to create a race of men capable of putting to its highest use not only coal, as long as coal remains, but whatever source of power may succeed coal. If we do not use the means we possess, then nothing is more certain than that, within a period of years which will count for little in the world's history, the wealth, population, and power of this country will fade.

Just as we can now write that only 150 years separates this country from a prior condition of great poverty, so it may come to

be written, by the time another 150 years have passed, that a short period of three centuries witnessed the rise and fall of Britain as a great Power; so swift is modern economic change that it is within the bounds of possibility that three centuries from 1750 may prove to be far too long a term to cover the history of British wealth.

Jevons, in the preface to the second edition of his great work, pleaded for 'a general system of education which may effect for a future generation what is hopeless for the present generation,' and went on to say, 'one preparatory and indispensable measure, however, is a far more general restriction of the employment of children in manufacture. At present it may almost be said to be profitable to breed little slaves and put them to labour early, so as to get earnings out of them before they have a will of their own. A worse premium upon improvidence and future wretchedness could not be imagined.'

These words were written in 1866. Six years later the Elementary Education Act was passed, and in the years that have elapsed there has been further restriction of the labour of children. But amongst our

46,000,000 of people in 1914, it is the fact that while there has been an undoubted educational advance, we have, if in a larger population, more ignorant and untrained children than in 1872.

It is the fact that to-day nearly the whole of the children of the working-classes leave school at thirteen years of age with a mockery of education which amounts to little more than the power to read and write and to do a little simple arithmetic. What would be the fate of children so equipped in a country deprived of that great but wasting advantage which enables it to employ many people successfully upon large scale rough work?

In 1909 the Board of Education appointed a Committee to report upon the subject of Continuation Classes. That Committee prepared statistics relating to the attendance or non-attendance at school of the entire population of England and Wales between the ages of eleven and twenty-one years. Every sort and kind of school, including secondary schools, technical institutions, reformatories, and evening schools, but excluding Sunday schools, was taken into account, and all classes of children, rich and poor, were

included. The figures collected related to 1906–7. Let us note the remarkable result :—

Of the children of eleven years of age, numbering 683,700, 99·3 per cent. were at school.

Of the children aged twelve years, numbering 687,300, 98 per cent. were at school.

Of the children of thirteen years of age, numbering 690,300, 77·4 per cent. were at school.

Of the children of fourteen years of age, numbering 691,000, 36 per cent. were at school.

And these figures, be it remembered, relate to both day schools and to evening schools, and to all classes of children. If we have regard to public elementary schools only, then we have the following facts :—

CHILDREN ATTENDING PUBLIC ELEMENTARY SCHOOLS

At Age	Number at School
12	597,000
13	408,000
14	67,800
15	6,900

At thirteen years of age the attendance is 88,000 less than at twelve, and at fourteen

it is 340,000 less than at thirteen. Writing forty-eight years after Jevons, it is still necessary to plead for a 'far more general restriction' of the employment of children, and for an education worth the name.

Nor is it the children of the elementary schools who alone need our attention. The nation, as a whole, fails to realise the nature of the scientific advance. Rule-of-thumb is still the guide of a considerable part of our industrial operations. It follows that in those arts and manufactures which are least dependent upon proximity to coal, we are least efficient.

I know of no more illuminating document in this connection than the report upon the brassworkers of Berlin and of Birmingham—a comparison made by three gentlemen of various political opinions; an employer, a Brassworkers' Society Secretary, and a dispensary committee man, who visited Berlin in 1905. They point out that as long as the Birmingham manufacturer deals with the plain styles to which he is accustomed, he does well enough, but that when he desires to get away from Birmingham work, he 'finds himself in difficulties.' Whereas the Berlin

training schools have produced artists and trained artisans, the Birmingham manufacturer, for lack of these, has to follow where the Germans 'lead the way.' 'It is on the intellectual side,' say the reporters, 'that Birmingham requires to adapt itself to changed conditions—not to cheapening its wares, but to getting more conception into them.'

If we visit the great centres where British wealth chiefly arises, what do we find? Large scale work, often of the simplest character, is successfully carried on under present conditions by the aid of cheap power in a world where there is still room for the sale of large quantities of such output. When we examine the condition of the people who produce the wealth, we realise that they are not only getting too small a return for their labour, but that little or no attempt is being made to fit them to produce goods of a higher class than those to which their hands are now subdued.

Every year that passes means the cancellation of opportunity, and brings us a year nearer to the time when rough and ready will not do, and when manufactures, to be saleable, will have to be joint productions of science

and artistry. That future, in which coal will play no part, will be a future in which many of the things that now find a ready market will not be produced at all.

The probability is that the nation will have a considerable breathing time in which to prepare itself for the new conditions in which it will be on a level of opportunity with all the white nations; in which, instead of having superior advantages to the other white nations, it will be either on an equality or at a disadvantage. But there is no guarantee as to the length of the period, as we have seen. There should be no further delay, therefore, in the educational advance.

Properly viewed, the conservation of coal, and the preparation for a coal-less future, are but parts of the national organisation without which it is impossible for the nation to advance to the full use of its powers and the greatest development of its economy. In earlier pages of this work we have seen how largely the labour of the nation runs to waste, and in what poor results the arduous work of so many millions of men, women, and children is exhibited.

The measures that are needed to make more effective the work of the British people in the present are of precisely the same kind that are needed to secure the safety and welfare of the nation in the future. The neglect of men has gone hand in hand with neglect of the natural resources upon which men work. It has sufficed us that a veneer of well-being has been created to cover up the deficiencies of the mass of the national material, and it is not difficult to assume an attitude and to take a point of view from which the veneer looks well enough. In these later days, however, a host of reformers have arisen who continuously pierce the veneer, and under the surface the fabric is increasingly shaken by explosions of social discontent.

It is not enough, however, merely to regard the nation as an established institution, founded upon unalterable economic elements which will remain constant while we tinker and tinker again with small reforms, here a little and there a little. It is a profound mistake to suppose that British wealth will indefinitely remain while we potter about with political panaceas which set a nation

by the ears while encouraging it to neglect the things that really matter.

There is nothing more inherently stable about the wealth of Britain than there was about the wealth of Venice, and it may not last as long. If therefore, we desire to deal seriously with a serious subject, it is necessary for us to think and to act upon a scale commensurate with the issues at stake. The future of Britain may be happily secured by adequate measures of national organisation. Without them—if the future of Britain is to be resigned, alike in respect of its natural resources and its people, to private exploitation for private gain—it is impossible for British wealth to endure.

INDEX

ADVERTISING, waste of, 148.
Afforestation, 58, 137.
Africa, coal of, 185.
Agricultural output, 85.
Agriculture, production in United Kingdom, 58.
——, relation to wealth, 18.
America (see *United States*).
Argentina, area, 18.
——, population, 18.
Asbestos, 62.
Atomic energy, 220.
Australia, coal of, 184.
Austria-Hungary, coal production, 169.

BALFOUR, Mr A. J., on capitalists, 136.
Becquerel, 217.
Belgium, coal production, 169.
Berlin, brass trade, 250.
Birmingham, brass-workers, 250.
Bowley, Professor, on national income, 114.
Brassworkers, British and German compared, 250.
British Empire, coal production, 183.
Building, production, 95.

CANADA, area of, 18.
——, coal of, 185.
——, population of, 18.
Capital, estimate of, 125.
——, nature of, 121.
——, relation to ideas, 153.
——, waste of, 140.
Census of production, 73.
Chemicals, production, 80.
China, coal of, 170, 187.
Clothing trades, production of, 80.

Coal, advantage of native supply, 63.
——, American output, 69
——, British output, 69.
——, British resources, 174–8.
——, conservation of, 179, 227.
——, exports of, 67.
——, exhaustion, 174–6.
——, foundation of British wealth, 26.
——, German output, 69.
——, limitation of the Vend, 55.
——, magnet for industry, 65.
——, price of, 190.
——, relation to invention, 30.
——, relation to shipping, 66.
——, Royal Commission on, 172.
——, substitutes for, 210.
——, use of, 241.
——, waste of, 234, 235, 236, 237.
——, world output, 69, 169.
Commerce, analysed, 71.
——, importance of, 63.
——, of United Kingdom, 49–56.
Competition, 159.
Continuation schools, 248.
Copper, 60, 61.
Cotton, consumption of, 44.
Cotton goods, consumption, 100.
Cotton trade in United Kingdom, 44, 45.
Curie, Madame, 217.

Darby, Abraham, smelted iron with coal, 28.
Death-rate, as affected by machinery, 38.
Distribution of wealth, 110.
Distribution, relation to production, 16–20.
——, waste in, 160.

Education, importance of, 246.
Electrical power transmission, 239.

Emigration, from Ireland, 20.
England, population, 19, 23.
Exports, United Kingdom, 51–4.

FERRANTI, Mr DE, on electrical power transmission, 238.
Fiscal policy, 22, 52.
Fisheries, output, 84.
Flax, 62.
Flux, Mr A. W., quoted, 175.
Food trades, production, 80.
France, coal production, 169.
——, iron of, 42, 43.
——, shipping of, 201.
Free Trade, 22, 52.
Frustration of capital saving, 140.
Furniture, production, 98

GEORGE, HENRY, quoted, 156.
Germany, coal production, 169.
Germany, coal of, 188, 189.
——, iron production, 42, 43.
——, railways of, 126.
——, rise of, 34, 165.
——, shipping of, 201.
——, water-power, 216.
Gladstone, on coal conservation, 245.
Glass, production, 102.

HEMP, 62.
Hides, 62.
Houses, production, 96.
——, value of, 127.

IRON, 60, 61.
——, fuel in relation to, 29.
——, production in eighteenth century, 28.
——, production of world 42, 43, 80.
——, production of Britain, 41, 43.
——, production of America, 43.
——, production of Germany, 43.

Iron, production of France, 43.
——, production of Russia, 43.
——, smelted with coal, 28.
——, used against Nature, 124.
Ideas, source of wealth, 153.
Imports, United Kingdom, 51–4.
Inclosure Acts, 25.
Increment of material wealth, 87.
India, coal of, 184.
India-rubber, 62.
Industrial output, 79 *et seq.*
Industrial revolution, 32.
Industry, relation to coal, 68.
Infantile mortality, 38.
Interest, high rate earned abroad, 132.
——, principle of, 156.
Invention, foreign lead, 35.
Invention in eighteenth century, 29.
Inventions, 151.
Ireland, cause of poverty, 28.
——, emigration from, 21.
——, population of, 19.
——, poverty of, 17, 20.
Italy, 64.

Jevons on coal, 27.
——, theories of, 172.
Joint-stock companies, 143.
Jute, 62.

Lancashire, cotton trade, 45.
Land, a source of wealth, 121.
——, of United Kingdom, 57.
——, relation to wealth, 231.
—— value, 140.
Lead, 60, 61.
Leather, production of, 80.
Life insurance, 107.
Limestone, 62.
Limitation of the Vend, 55.
Luxuries, 112.

MACHINERY, relation to life, 33.
Made in Germany, 208.
Manchester, growth of, 39.
—— Ship Canal, 136.
Material wealth, production of, 73.
Materials, 60.
Mercantile marine, 66.
—— effect of cutting of Panama Canal, 195.
Metal trades, production of, 80.
Mines, production of, 80.
Munich, 216.

NATION of shopkeepers, 74.
National Conservation Commission of U.S.A., 229.
National Dividend, 105.
——, amount of, 109.
——, distribution, 110.
——, transmutation of, 117.
National Income, 105.
National Power Commission, 229.
Natural resources, 121.
Nature's gifts, 121.
Navy, example of use of inventions, 157.
Necessaries, 112.
Net output, meaning of, 78.
'New' countries, 18
Newcomen, 30.
New Zealand, coal of, 184.

OFFICIALS, 107.
Oil as power producer, 210.
Oil, production of, 211.
Oils, 62.
Old Age Pensions, 21, 117.
Open-field system of agriculture, 24.
Organisation, lack of, 160.
Oversea investments, 129–32.

PAISH, SIR GEORGE, on oversea investments, 130.
Panama Canal, 137, 195
Paper, production, 80.

Patents Act, 151.
Petroleum, production, 211.
Population, 19, 23, 24.
——, American, 204.
——, as affected by Industrial Revolution, 32.
Porter, G. R., quoted, 39.
Post Office, 107.
Poverty line, standard suggested, 92.
Poverty, recent, in England, 24.
Power, 123.
Power and wealth, 32.
Price of coal, 190.
Production, 73, 79 *et seq.*
——, conditions of, 18.
Prosperity, coal the cause of, 26, 68.
Prussia, railways of, 126.
Public utility services, production of, 80.

Radium, 217.
Railway, why invented, 31.
Railways, 154.
——, capital of, 126.
—— of Prussia, 126.
Ramsay, Sir William, quoted, 178.
Raw materials, 60.
Retail profit, 159.
Roosevelt, Ex-President, on conservation, 229.
Royal Commissions on coal, 172.
Russia, coal production, 169.
——, iron production, 43.

Savery, 30.
Saving, 140.
Scholars, number of, 249.
Science, importance of, 36.
Scotland, population of, 19.
Seebohm on the English village community, 25.
Services, value of, 106–8.
Shipping, American, 194, 201.
——, British, 201.
——, German, 201.
——, oil-power, 215.
——, relation to coal, 66.
Silk, 62.
Simmersbach, quoted, 188.

Slate, 62.
Soddy, Professor, on radium, 222.
Solar heat, 217.
South Africa, coal of, 185.
Spain, 64.
Steam engine, 30, 31.
Steamships, of world, 201.
Stephenson, George, 32.
——, on coal, 32.
Suez Canal, 196.

Textile materials, 62.
Textile trades, production of, 80.
Thomas, Mr D. A., on Coal Commission, 172.
Tide-power, 217.
Timber, 47, 48, 49, 59.
—— of America, 233.
—— production, 80.
——, relation to iron, 29.
Tin, 60, 61.
Trade of United Kingdom, 71.
Transmutation of elements, 220.
Trevithick, 31.

Under-consumption, 94.
United Kingdom, analysis of commerce, 71.
——, capital of, 125.
——, coal and wealth, 26.
——, commerce of, 49–56.
——, dependence on imported materials, 62.
——, economy of, 57.
——, imports of materials, 62.
——, iron production, 42, 43.
—— lead in industry, 33.
——, materials of, 60.
——, metals of, 61.
——, National Income, 109.
——, natural resources, 57, 69.
——, oversea investments, 129, 130.
——, production of, 79–93.
——, production of material wealth, 73 *et seq.*
——, shipping and coal, 66.

Patents Act, 151.
Petroleum, production, 211.
Population, 19, 23, 24.
——, American, 204.
——, as affected by Industrial Revolution, 32.
Porter, G. R., quoted, 39.
Post Office, 107.
Poverty line, standard suggested, 92.
Poverty, recent, in England, 24.
Power, 123.
Power and wealth, 32.
Price of coal, 190.
Production, 73, 79 *et seq.*
——, conditions of, 18.
Prosperity, coal the cause of, 26, 68.
Prussia, railways of, 126.
Public utility services, production of, 80.

RADIUM, 217.
Railway, why invented, 31.
Railways, 154.
——, capital of, 126.
—— of Prussia, 126.
Ramsay, Sir W
quoted, 178.
Raw materials, 6
Retail profit, 159.
Roosevelt, Ex-Pre
on conservation
Royal Commissio
coal, 172.
Russia, coal prod
169.
——, iron producti

SAVERY, 30.
Saving, 140.
Scholars, number o
Science, importance
Scotland, populati
19.
Seebohm on the E
village communi
Services, value of,
Shipping, American
201.
——, British, 201.
——, German, 201
——, oil-power, 21
——, relation to co
Silk, 62.
Simmersbach, q
188.

United Kingdom, wealth of, 17, 22, 109.
United States, British capital in, 131.
——, coal of, 33, 189.
——, iron production, 42, 43.
——, population, 204.
——, rise of, 165, 193.
——, shipping of, 201.
Usury, capitalisation of, 146.

Venice, commerce of, 74.

Waste in competition, 159.
Water-power, 215.
Watt, 31.
Wealth, coal the foundation of, 26.
Wealth, distribution of, 110.
——, foundation of, 17.
——, frustration of production, 151.
—— of modern states, 17.
——, question of endurance, 253.
——, relation to life, 40.
——, rise of British, 37.
Wheat of U.S.A., 193.
White coal, 216.
Wilkinson, Mr George, on electrical power transmission, 242.
Wool, 46.
Woollen goods, consumption, 101.
Woollen trade, 45, 46, 47.

Zinc, 60, 61.